THE 300TH ANNIVERSARY OF THE PAPER INDUSTRY

PAPER
PAPERBOARD
WOOD PULP
CAPACITY

PaperIndustryUSA

1989 - 1993

5 YEARS

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The American Paper Institute has conducted annual capacity surveys in the primary pulp and paper industry for more than thirty years. Over time, the scope of the surveys has expanded significantly and now includes responses from producers of more than 90% of total U.S. paper, paperboard and wood pulp.

The outline below is intended to clarify definitions and methodology and to assist the user in utilizing the capacity and raw materials data in the survey report.

•Capacity projects included in the survey are firm commitments. Such projects will usually be approved by senior management or boards of directors, have assured financing and, in many instances, will include site acquisition and signed contracts for machines or equipment.

•Published capacities for paper and paperboard represent potential for *primary finished production* before conversion into end products. Capacities for wood pulp are measured at a 10% moisture content. Consumption of pulp wood, waste paper and other fiber are "as received at mill."

•The definition of practical maximum capacity assumes normal operating conditions, full demand, adequate supplies of raw materials and available labor. The concept assumes that machines operate on an "all out" basis on their customary grade mix.

•Daily capacities are extrapolated to annual totals based on the maximum number of days each machine can operate in one year. Downtime, scheduled before the start of the year, other than due to lack of orders is excluded from capacity. Unscheduled downtime, is included.

(Maximum operating days reported on pages 12 through 17 of this survey represent weighted averages of all machines in the industry).

•Capacity changes include the effect of new machine installations, rebuilds, shutdowns, revised operating schedules, grade and basis weight changes or other modifications to existing facilities. Changes also include grade reallocations on "swing" machines which reflect intermediate or long-range market strategies and not short-term adjustments to market conditions which are often revised on a monthly basis.

•Capacities of "swing" or multiproduct machines are distributed on the basis of actual grade mix. For example, a swing machine in one year may be capable of producing 100,000 tons of unbleached kraft linerboard, if run exclusively on board, or 80,000 tons of unbleached kraft paper, if run exclusively on paper. If, in fact, the machine produces board for 75% of its operating year and paper for 25%, its capacity would be published as 75,000 tons of linerboard and 20,000 tons of paper. Planned changes in grade allocations (swings) in future years would be calculated in the same way.

•Capacities of dismantled or permanently inactive machines are removed from estimates immediately on shutdown. Capacities of other idle machines are removed after one year unless resumed operation is in prospect.

•Capacities of individual mills are directly related to verified levels of production.

•Edit procedures establish that types and quantities of fiber consumed in each mill are consistent with verified annual production.

•Inconsistencies in reported data are reconciled by direct contacts with company executives.

•Published capacities are grade totals summarized to regional and industry levels. Specific establishment data are not disclosed in the survey unless publicly announced by the respective companies.

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OVERVIEW

This year's survey shows that the U.S. paper industry is doing its part to maximize paper recycling in support of its national goal to recover, for reuse both at home and abroad, 40% of all paper consumed in the United States in 1995.

Despite increasingly uncertain economic prospects, the industry plans to expand total waste paper consumption at a pace averaging 7.2% per year over the next three years, an increase from the 5.9% average annual growth rate projected last year for the 1989-1992 period. The consumption of waste paper at U.S. mills, led by old newspapers and mixed papers, is now growing more than twice as fast as that of all other fiber sources and, by 1993, is expected to reach 29.3% of all fiber consumed at domestic mills.

To achieve this growth in consumption, pulp and paper companies are investing in new recycling facilities which will increase consumption of waste paper by more than five million annual tons over the period reported. In 1993, if mills operate at full capacity, 27,148,000 tons of waste paper would be processed and used to manufacture new paper and paperboard.

In addition to new investments in recycling facilities, the industry remains committed to maintaining modern and efficient manufacturing plants capable of producing high quality, low cost products that can compete effectively in domestic and global markets. Responses to this industrywide survey show that, in 1989, more than 60% of all primary manufacturing plant has been newly installed or significantly upgraded within the last ten years. This commitment to modernization and global competitiveness sets the pulp and paper industry apart from many other basic industries and represents

Note: Unless stated otherwise, all references to paper and paperboard and wood pulp exclude construction grades.

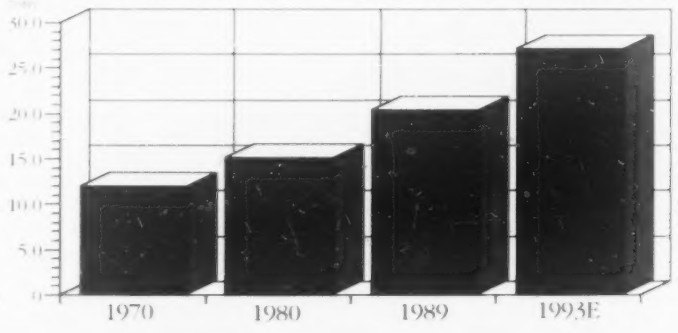
TABLE 1: growth trends in capacity

Thousands short tons

GRADES	ADDITIONS 1991-1993 3 YEAR INCREASE	ADDITIONS 1991-1993 AVERAGE ANNUAL GROWTH	ADDITIONS 1980-1990 10 YEAR INCREASE	ADDITIONS 1980-1990 AVERAGE ANNUAL GROWTH
TOTAL ALL GRADES PAPER & PAPERBOARD	**7,503**	**2.8**	**15,464**	**2.0**
TOTAL PAPER & PAPERBOARD	**7,487**	**2.9**	**17,670**	**2.4**
TOTAL PAPER	**3,711**	**2.8**	**9,552**	**2.6**
NEWSPRINT	602	2.9	1,992	3.5
PRINTING & WRITING	2,456	5.4	7,144	5.6
of which Uncoated Papers	1,262	2.9	3,800	3.2
of which Coated Papers	1,150	4.6	3,052	4.9
PACKAGING & IND. CONV.	189	1.1	(606)	(1.0)
TISSUE	373	2.0	1,022	1.9
TOTAL PAPERBOARD	**3,776**	**2.9**	**8,118**	**2.2**
UNBLEACHED KRAFT	1,491	2.3	5,571	2.9
of which Kraft Linerboard	1,158	1.9	5,025	3.0
SOLID BLEACHED	670	4.6	439	1.0
SEMICHEMICAL	226	1.3	899	1.7
RECYCLED	1,389	4.4	1,409	1.5
of which Containerboard	1,086	11.7	930	4.2
CONSTRUCTION GRADES	**15**	**0.2**	**(2,206)**	**(6.8)**
TOTAL ALL GRADES WOOD PULP	**3,669**	**1.8**	**11,002**	**1.8**
TOTAL WOOD PULP FOR PAPER & BOARD	**3,689**	**1.8**	**12,289**	**2.1**
DISSOLVING & SPECIAL ALPHA	5	0.1	(66)	(0.4)
SULFITE	(20)	(0.4)	(251)	(1.4)
SULFATE*	3,626	2.3	10,721	2.4
Bleached	3,147	3.6	8,178	3.5
Unbleached	478	0.7	2,000	1.2
SEMICHEMICAL	18	0.1	87	0.2
MECHANICAL	62	0.3	1,799	5.1
CONSTRUCTION GRADES	**(20)**	**(1.0)**	**(1,287)**	**(9.8)**
TOTAL ALL GRADES MARKET WOOD PULP	**1,243**	**4.2**	**2,599**	**3.3**
CHEMICAL PAPER GRADES	1,240	5.0	2,747	3.4

** Includes screenings* *Not adjusted for rounding differences*

GROWTH IN WASTE PAPER CONSUMPTION 1970-1993*



**Waste paper utilized as furnish for paper & paperboard manufacture*

E=Estimate

TABLE 2: new paper & paperboard capacity 1991-1993

Thousands short tons

SOURCE OF CHANGE	3 YEAR INCREASE	
TOTAL INCREASE	7,487	100.0%
GREENFIELD MILLS	131	1.7
NEW MACHINES IN EXISTING MILLS	4,109	54.9
NET IMPROVEMENTS	3,247	43.4

Thousands short tons

AVERAGE CAPACITY OF MACHINES	TOTAL INDUSTRY	NEW MACHINES
NEWSPRINT	100	245
PRINTING & WRITING	56	263
TISSUE	29	62
KRAFT PAPERBOARD	275	450
RECYCLED PAPERBOARD	55	280

part of a total capital outlay of more than $82 billion from 1980 to 1989. Net gains in manufacturing capacity during this ten-year period include 16,000,000 annual tons for paper and paperboard and 13,000,000 tons for wood pulp.

Looking forward, capacity for paper and paperboard is expected to increase this year by 1,882,000 tons, or 2.3%, to reach 84,040,000 tons. Additional expansion projects, including ten new paper machines designed to utilize waste paper, should yield 7,487,000 additional annual tons of capacity over the three future years in this survey, 1991 through 1993. These gains will represent a rate of increase in capacity averaging 2.9% per year, and the industry potential to produce finished paper and paperboard should reach 91,527,000 tons in 1993.

This rate of overall capacity expansion tends closer toward the historical average of 2.4% annually, than did the 3.4% yearly growth rate reported by producers last year. Increasingly, uncertain economic prospects are resulting in delays and stretch-outs of expansion projects and, by 1992, capacity is now expected to be 1,558,000 tons, or 1.7%, below the level reported in last year's survey.

Expansion in wood pulp capacity is planned at lower rates than for paper and paperboard. Industry capacity for wood pulp is now expected to reach 65,504,000 tons this year and to expand at an annual rate averaging 1.8% through 1993. If this slower rate of growth is sustained over these years, wood pulp capacity will reach 69,193,000 tons in 1993 and, at that level, will be 783,000 annual tons behind last year's survey estimate for 1992. Almost all of this amount reflects shutdowns and curtailments of more than one million annual tons of capacity at wood pulp mills. Most of these capacity losses will be replaced by waste paper processing plants that will permit producers to utilize a greater proportion of secondary fiber in their products.

Continuing the trend reported in our survey last year, capacity dedicated to the production of market wood pulp will increase at a 4.2% annual rate from 1991 through 1993. This above-trend rate of expansion reflects the industry's strong participation in global pulp markets. Almost all of the gain will be in the bleached sulfate paper grades which will benefit from the startup, in 1991 and 1992, of three major new facilities in the South Atlantic and East South Central regions of the country. Capacity for all grades of market wood pulp is estimated to increase by 1,243,000 annual tons, from 9,400,000 tons in 1990, to 10,643,000 tons in 1993.

As noted, the industry has invested heavily in new manufactur

TABLE 3: annual capacities

Thousands short tons

YEAR	PAPER & PAPERBOARD			WOOD PULP		
	PERCENT INCREASE	CAPACITY ADDITIONS	ANNUAL CAPACITY	PERCENT INCREASE	CAPACITY ADDITIONS	ANNUAL CAPACITY
1970	—	—	53,260	—	—	43,505
1971	1.6	876	54,136	2.3	1,006	44,511
1972	3.2	1,737	55,873	2.3	1,029	45,540
1973	4.1	2,291	58,164	3.6	1,649	47,189
1974	2.3	1,363	59,527	0.9	448	47,637
1975	1.0	613	60,140	—	22	47,659
1976	1.9	1,167	61,307	2.3	1,100	48,759
1977	1.1	697	62,004	2.4	1,151	49,910
1978	1.8	1,087	63,091	(0.2)	(122)	49,788
1979	2.4	1,524	64,615	3.7	1,849	51,637
1980	2.7	1,753	66,368	3.1	1,578	53,215
1981	2.7	1,804	68,172	3.1	1,676	54,891
1982	2.8	1,914	70,086	2.2	1,234	56,125
1983	1.5	1,040	71,126	—	18	56,143
1984	2.8	1,972	73,098	2.8	1,599	57,742
1985	1.6	1,203	74,301	1.6	899	58,641
1986	2.0	1,476	75,777	1.9	1,109	59,750
1987	3.2	2,409	78,186	2.4	1,422	61,172
1988	3.0	2,347	80,533	2.9	1,778	62,950
1989	2.0	1,625	82,158	2.1	1,339	64,289
1990E	2.3	1,882	84,040	1.9	1,215	65,504
1991E	3.8	3,220	87,260	3.0	1,936	67,440
1992E	2.6	2,259	89,519	2.5	1,673	69,113
1993E	2.2	2,008	91,527	0.1	80	69,193

E=estimate

ing plant over the last ten years. Our survey this year reports that this investment will continue at an accelerated pace over the next three years. Table 2 shows that new machines located in both new and existing mills will provide 57% of all additions to capacity from 1991 through 1993.

Miscellaneous additions from improvements to existing plant and other operating efficiencies will provide the remaining 43% net gain in capacity. All of these new installations will incorporate the latest design technology and will be among the largest paper machines in their respective grade categories.

Regional Capacity

Regional capacity estimates in this survey confirm the well- established position of the South Central and South East states as the major pulp and paper producing regions of the country. Table 4 shows that, in 1989, these two regions alone had the collective potential to produce more than 53% of all domestic paper and paperboard and more than 68% of all domestic wood pulp. Mills in the South Central states will house the largest share of future growth in capacity and, in the four years 1990 through 1993, will increase their share of the U.S. total with net additions comprising 34.1% of all new capacity for paper and paperboard and 56.3% of all new capacity for wood pulp.

With the exception of the North Central states, which will gain share of paper and paperboard capacity, all other regions will add new production facilities over the next three years at lower rates which will result in share loss of both paper and paperboard and wood pulp capacity.

Raw Materials

Increasing projections for waste paper use are being offset by slower growth in wood pulp consumption, and the mix of primary and secondary fibers is expected to change significantly during the next three years. Table 5, on page 6, shows that consumption of waste paper, which totaled a record 20,442,000 tons in 1989, is estimated to increase at a four-year average rate of 7.4% per year to reach a level of 27,148,000 tons in 1993. Consumption of wood pulp manufactured from primary fibers will increase at a slightly higher rate than wood pulp made from secondary materials, including wood waste from manufacturing and logging operations. In total, fibers obtained from secondary materials are expected to increase share of total fiber consumption from 53.6% in 1989 to 55.7% in 1993.

Total domestic production of paper and paperboard has increased in 1989 and 1990 at rates lower than previously anticipated and, as a result, total fibers consumed as furnish for papermaking in 1990 are below year-earlier estimates by 1,791,000 tons. Fiber consumption is expected to increase in future years and, at capacity, is now expected to reach 92,672,000 tons in 1993.

TABLE 4:
regional capacity distribution— percent of total

REGIONS	PAPER & PAPERBOARD			WOOD PULP		
	SHARE OF U.S. TOTAL 1980	SHARE OF U.S. TOTAL 1989	SHARE OF CAPACITY INCREASE 1990-1993	SHARE OF U.S. TOTAL 1980	SHARE OF U.S. TOTAL 1989	SHARE OF CAPACITY INCREASE 1990-1993
NORTHEAST	17.1	14.2	6.6	8.3	7.5	1.0
NORTH CENTRAL	17.7	17.9	22.0	7.1	7.5	5.1
SOUTHEAST	24.3	24.3	23.4	31.8	31.6	30.8
SOUTH CENTRAL	26.8	29.0	34.1	35.5	36.7	56.3
WEST	14.1	14.6	13.9	17.3	16.7	6.7

PAPER GRADES

Newsprint

Four new paper machines, two with associated waste paper deinking plants, began operations during the last two years and will contribute to a 532,000 ton, or 8.4%, increase in newsprint capacity this year. This exceptional one-year increase, which exceeds all gains in capacity for newsprint over the previous six years, will bring the industry potential for the production of newsprint to 6,828,000 annual tons in 1990. Residual gains from these machines, together with the added capacity of a fifth new machine and deinking plant scheduled to come into production in 1991, will add a further 602,000 annual tons and, by 1993, U.S. newsprint capacity is estimated to reach 7,430,000 annual tons. The three-year rate of growth will average 2.9% per year.

Newsprint manufacturers are now planning to make additional investments in waste paper deinking plants beyond those already discussed. These facilities, which remove inks and clays from old newspapers and magazines, permit mills to greatly increase the tonnage of waste paper that can be reprocessed into new newsprint. At least 14 major producers are actively studying or have made commitments to install deinking plants in their mills. Of these, approved projects included in this survey will increase the consumption of old newspapers by 808,000 tons, or almost 50%, from 1990 to 1993.

Canadian mills produce more than one-half of all newsprint consumed in the U.S. and any analysis of newsprint markets must take this factor into account. Data collected by the Canadian Pulp & Paper Association show that Canadian producers plan to add newsprint capacity at a 3.1% annual rate to reach 11,050,000 metric tons in 1993. Detailed information on North American and World capacities for newsprint, as well as for other grades of paper and wood

TABLE 5:
fiber sources for paper & paperboard manufacture

Thousands short tons

GRADES	1989 ANNUAL TONS	1989 PERCENT	1990 ANNUAL TONS	1991 ANNUAL TONS	1992 ANNUAL TONS	1993 ANNUAL TONS	1993 PERCENT	AVERAGE ANNUAL GROWTH 1989-1993
TOTAL CONSUMPTION	**80,755**	**100.0**	**83,783**	**87,831**	**90,620**	**92,672**	**100.0**	**3.5**
PRIMARY MATERIALS								
WOOD PULP FROM PRIMARY FIBERS	37,481	46.4	38,372	39,870	40,942	41,065	44.3	2.3
SECONDARY MATERIALS	**43,274**	**53.6**	**45,411**	**47,961**	**49,678**	**51,608**	**55.7**	**4.5**
WOOD PULP FROM SECONDARY FIBERS	22,514	27.9	23,053	23,798	23,955	24,086	26.0	1.7
WASTE PAPER*	20,442	25.3	22,044	23,826	25,362	27,148	29.3	7.4
OTHER	318	0.4	314	341	361	374	0.4	4.1

Note: Consumption for 1991-1993 assumes capacity levels of production
** Includes the following tonnage consumed in the manufacture of molded pulp products: 1989, 222,000 tons; 1990, 253,000 tons; 1991-1993, 270,000 tons*

pulp, are included in the tables on pages 20 and 21 of this survey.

Printing and Writing Papers

Following a below-trend 1.3% capacity increase for printing and writing papers in 1990, expansion consistent with historical pattern is planned for the three future years in this survey. Capacity growth should average 3.4% yearly, and the industry total should increase by 2,546,000 annual tons, to reach 26,488,000 tons in 1993. Five new paper machines are scheduled to be brought online in 1991 and 1993, and their capacities will contribute significantly to the overall gain. Most of the added capacity will be for uncoated and coated free sheet grades.

REDUCED CAPACITY ESTIMATES*	
BASIS FOR REDUCTION	**1992 REDUCED CAPACITY ESTIMATES***
Facilities shut down	(208,000)
Downsized or cancelled expansions	(307,000)
Delayed or stretched out expansions	(348,000)
Miscellaneous	83,000
Net Difference	**(780,000)**

** Difference in 1992 annual capacity for uncoated free sheet and coated papers in the 1990 and 1989 surveys.*

Capacities for 1992, especially for uncoated free sheet and coated papers, are considerably lower than estimates reported in our survey last year. As outlined below, the basis for reduced estimates include removal of capacity for mills and machines shut down, downsized or cancelled expansions, and stretch-outs of projects from earlier years into 1993 and beyond.

Unbleached Kraft Packaging Papers

During the next three years, the permanent shutdown of small older machines, will offset capacity increases from a new machine brought into operation in late 1990. Overall, capacity should decline slightly to an annual level of 2,746,000 tons in 1993.

Tissue

After a 3.1% capacity increase in 1990, producers plan to add 373,000 annual tons of new capacity for tissue papers over the three years 1991-1993. These additions to capacity will yield a 2% annual average rate of increase, continuing a long-term growth trend that has averaged 1.9% annually over the previous ten years.

In recent years, new mills and new machines, rather than rebuilds or upgrades of existing plant, have provided most of the new capacity for tissue papers. This trend is continued in this survey: in the four years 1990 through 1993, eight new paper machines will provide 96% of the total industry capacity increase. Four of these machines, with combined capacity exceeding 50% of the total increase, will rely on deinked waste paper for their fiber supply.

In addition to these confirmed projects, further expansions, which could cause an upward revision of industry capacity estimates, are under serious study by at least four major companies.

PAPERBOARD GRADES

Containerboard

During the next three years, capacity for all unbleached containerboard products* will be increased by 2,473,000 annual tons from 28,224,000 tons in 1990 to 30,697,000 tons in 1993. This gain in capacity represents a rate of increase averaging 2.8% per year, closely paralleling the 2.9% per year growth rate for total paper and paperboard, and is consistent with the 2.7% historical annual rate of growth in capacity over the previous ten years.

Increases in capacity for the component grades of containerboard vary significantly from the overall growth rate and reflect the industry's efforts to recycle increased amounts of waste paper. Capacity for kraft

**Unbleached kraft and recycled linerboard and semichemical and recycled corrugating medium*

linerboard, which contains predominantly virgin fiber, is expected to increase at a below-average rate of 1.9% annually to reach 20,770,000 tons in 1993. From a significantly smaller base, capacity for recycled linerboard, made exclusively from waste paper (or with a high waste paper content), is expected to increase at a high annual rate of just over 39% to reach 1,453,000 tons in 1993. Combined, the rate of increase in capacity for both grades should average 3.3% per year.

A more moderate trend is evident in rates of capacity growth for semichemical corrugating medium and recycled corrugating medium. Capacity for semichemical is expected to increase at a 1.3% annual rate through 1993 while recycled is reported to increase at a higher 2.5% annual rate.

Solid Bleached Paperboard

Capacity dedicated to the production of solid bleached paperboard remained level in 1989 and will decline this year by a total of 97,000 annual tons. For 1990 as a whole, the annualized capacity level will be 4,619,000 tons. All of this reduction in capacity, which will be restricted to the milk carton and food service grades, results from the conversion of a paper machine to produce other grades of paper, and from the reallocation of manufacturing facilities from the production of bleached paperboard to bleached bristols and bleached market pulp.

In the three years 1991-1993, the start up of a new paper machine, and other improvement projects, will add 670,000 annual tons of new capacity and will yield a 4.6% annual average rate of increase.

WOOD PULP GRADES

Dissolving and Special Alpha Pulps

Capacity for dissolving and special alpha pulps is expected to remain unchanged, at 1.5 million tons, from 1990 through 1993.

Chemical Paper Grade Pulps

Capacity increases for sulfate pulps, the dominant wood pulp grades, will total 3,626,000 annual tons in the three-year period 1991-1993, and will account for almost all of the new expansion in capacity for paper grade wood pulp over the period. Bleached grades will increase capacity by 3,147,000 tons, or 87% of the total gain, and, at a yearly rate of growth averaging 3.6%, will maintain their historic rate of increase.

Capacity for unbleached sulfate pulp will remain steady. Influenced by the shutdown of a major southern pulp mill and by plans to expand waste paper recycling facilities, capacity for this pulp grade is expected to increase by 478,000 annual tons through 1993. From a base level of almost 23,000,000 annual tons in 1990, new additions will result in a growth rate of 0.7% per year.

No growth in capacity is planned for sulfite pulps or for semichemical pulps, the other components of the chemical paper grade category.

Mechanical Pulps

As more and more newsprint and groundwood printing paper mills are modified to include deinked waste paper in their mix of fibers, capacity expansion plans in stone groundwood and refiner groundwood pulps and in thermomechanical pulps are being scaled back.

In the three-year period 1991-1993, mechanical pulp facilities, with capacities totaling almost 600,000 annual tons, will either be shut down or scaled back, mostly to accommodate increased consumption of old newspapers and magazines. This idle capacity has been removed from the estimates in this survey and, as a result, mechanical paper grade pulp capacity for the 1991-1993 years will increase by only 62,000 tons or 0.3% annually. Capacity in 1993 is now estimated at 6,931,000 annual tons. In the 1989 survey, capacity for mechanical pulps was expected to exceed this level by 437,000 tons by 1992.

Market Pulps

Although growth in capacity for total wood pulp has slowed, plans for new and expanded market pulp facilities are continuing and capacity is increasing at near-record levels. Capacity for bleached sulfate paper grade market pulp, which comprises almost 80% of all market grades, is expected to increase at a rate averaging 5.2% annually, from 7,447,000 tons in 1990 to 8,682,000 tons in 1993. At this level, capacity for these pulps, which are sold in both domestic and foreign markets, will have more than doubled in the fourteen-year period beginning in 1980.

SUMMARY

This survey confirms that U.S. pulp and paper companies plan to make continuing investments in new manufacturing facilities. Expected additions to capacity between 1991 and 1993 total 7.5 million tons of new paper and paperboard capacity and 1.8 million tons of new wood pulp capacity. Despite a sluggish domestic economy, this sustained rate of investment evidences a determination by the industry to compete successfully over the long-term in both U.S. and foreign markets.

Also reported in this survey is an increase in the industry's rate of investment in waste paper recycling facilities. Plans to reclaim usable fiber from waste paper are being accelerated beyond levels anticipated earlier and reflect a commitment to increase recycling to the maximum extent possible.

capacity summary annual

Practical Maximum Basis
Thousands short tons

GRADES	1989	1990	1991	1992	1993*
Total All Grades	**84,316**	**86,181**	**89,416**	**91,676**	**93,683**
TOTAL PAPER & PAPERBOARD	**82,158**	**84,040**	**87,260**	**89,519**	**91,527**
Total Paper	**41,165**	**42,212**	**43,969**	**45,135**	**45,923**
NEWSPRINT	6,290	6,828	7,151	7,335	7,430
PRINTING & WRITING	23,637	23,942	25,089	25,918	26,488
Uncoated Groundwood	1,874	1,924	1,920	1,929	1,933
Coated Groundwood	4,341	4,398	4,553	4,596	4,628
Coated Free Sheet	3,503	3,638	4,023	4,386	4,557
Uncoated Free Sheet	12,092	12,145	12,717	13,104	13,398
Cotton Fiber	202	202	203	203	203
Thin Papers	281	270	261	258	255
Solid Bleached Bristols	1,345	1,365	1,412	1,443	1,514
PACKAGING & IND. CONV.	5,435	5,466	5,615	5,647	5,655
Unbleached Kraft	2,809	2,795	2,811	2,772	2,746
Bleached Packaging & Ind. Conv.	511	490	525	533	538
Specialty Packaging	644	685	728	752	757
Special Industrial	1,471	1,496	1,551	1,591	1,615
TISSUE	5,798	5,976	6,113	6,235	6,349
Total Paperboard	**40,993**	**41,828**	**43,292**	**44,384**	**45,604**
UNBLEACHED KRAFT	20,878	21,338	22,180	22,785	22,829
of which Kraft Linerboard	19,192	19,611	20,271	20,779	20,770
SOLID BLEACHED	4,716	4,672	4,843	5,056	5,289
SEMICHEMICAL	5,781	5,845	5,812	5,982	6,072
RECYCLED	9,617	10,026	10,455	10,560	11,415
of which containerboard	2,500	2,769	3,088	3,138	3,855
Construction Paper & Board	**2,157**	**2,141**	**2,156**	**2,157**	**2,157**

** Capacity additions presented here for 1993 include only presently known commitments and do not necessarily represent final expansion plans of the industry for that year.*

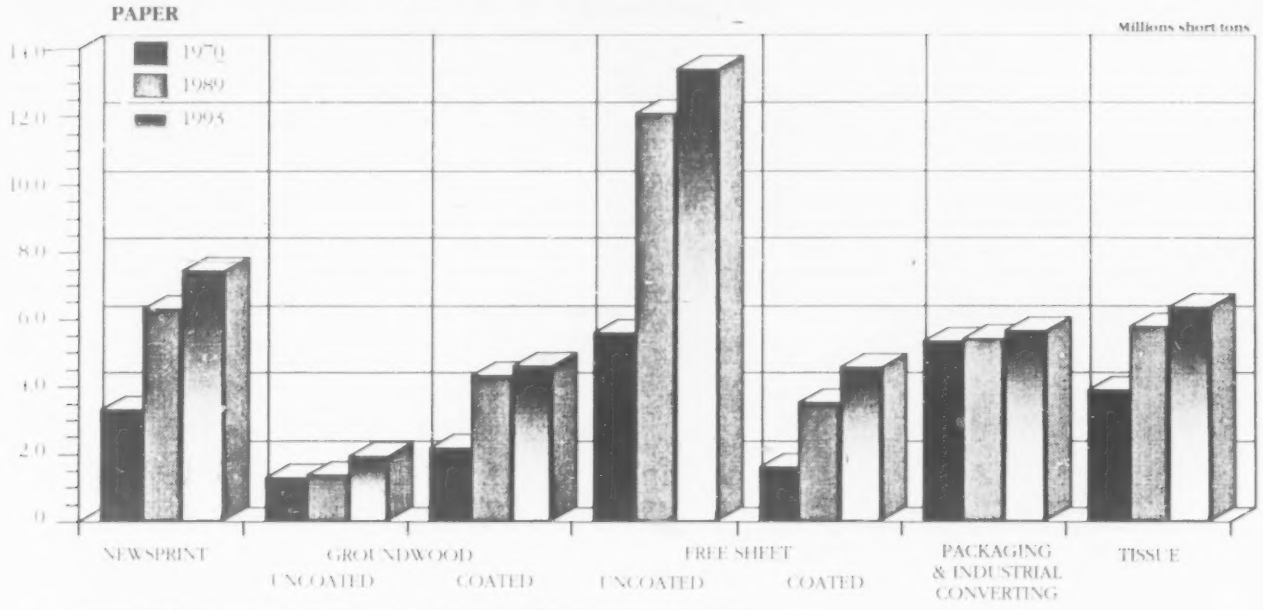
Totals not adjusted for rounding differences.

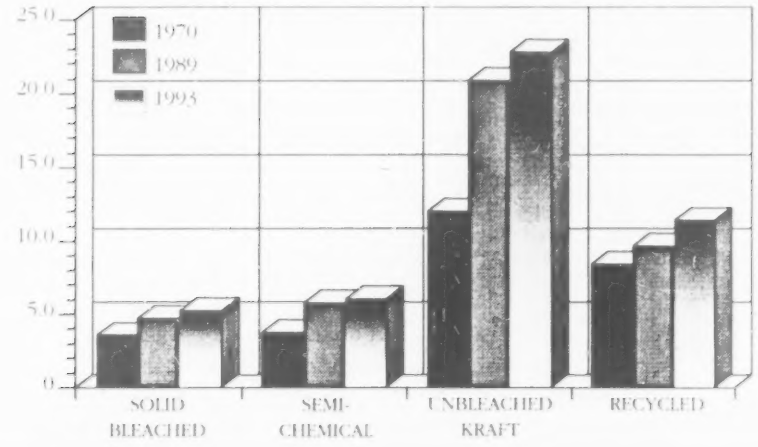
capacity reductions

paper & paperboard mills & machines shut down

Grades	1971-1975 Number of Machines	1971-1975 Number of Complete Mills	1971-1975 Annual Capacity	1976-1980 Number of Machines	1976-1980 Number of Complete Mills	1976-1980 Annual Capacity
TOTAL	**135**	**39**	**2,482**	**163**	**53**	**3,990**
Paper						
Newsprint	—	—	—	3	1	231
Printing & Writing	51	8	803	32	5	550
Packaging & Ind. Conv.	35	8	290	32	7	395
Tissue	6	4	52	25	8	246
Paperboard						
Unbleached Kraft	2	—	128	2	1	400
Solid Bleached	1	—	33	2	1	162
Semichemical	3	1	123	4	1	178
Recycled	29	14	872	35	12	1,295
Construction Paper & Board	8	4	181	28	17	533

capacity/annual growth comparison





PAPERBOARD
Millions short tons

Thousands short tons

Grades	1981-1985* Number of Machines	1981-1985* Number of Complete Mills	1981-1985* Annual Capacity	1986-1993* Number of Machines	1986-1993* Number of Complete Mills	1986-1993* ANNUAL CAPACITY Removed from survey	1986-1993* ANNUAL CAPACITY Not Removed from survey
TOTAL	**222**	**88**	**6,228**	**85**	**23**	**2,124**	**142**
Paper							
Newsprint	5	—	360	—	—	—	—
Printing & Writing	38	4	771	35	7	572	102
Pkg. & Ind. Conv.	31	7	821	15	4	555	—
Tissue	30	13	308	15	5	107	40
Paperboard							
Unbleached Kraft	5	—	742	3	—	602	—
Solid Bleached	—	—	—	2	—	142	—
Semichemical	7	2	553	4	—	455	—
Recycled	18	12	644	6	3	118	—
Construction Paper & Board	88	50	2,029	5	4	55	—

Shutdowns represent machines and mills reported to the API as permanent or indefinite closures and have been removed from capacity totals. Not all of the facilities have been dismantled and some portion of their productive capacity could be restored.

**Includes machines converted to produce other grades.*

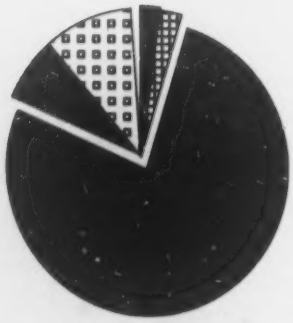
capacity summary annual

Practical Maximum Basis
Thousands short tons

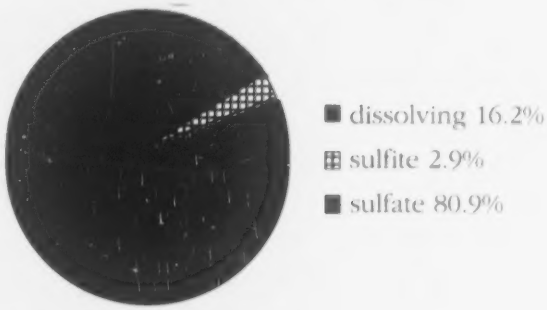
GRADES	1989	1990	1991	1992	1993*
Total All Grades Wood Pulp	**65,026**	**66,216**	**68,132**	**69,804**	**69,884**
TOTAL WOOD PULP FOR PAPER & BOARD	**64,289**	**65,504**	**67,440**	**69,113**	**69,193**
DISSOLVING	1,465	1,524	1,527	1,527	1,527
CHEMICAL PAPER GRADES	51,430	52,419	54,251	55,879	56,024
SULFITE PAPER GRADES	1,644	1,658	1,671	1,685	1,638
SULFATE PAPER GRADES	49,786	50,761	52,580	54,194	54,386
Bleached Softwood	14,196	14,576	14,882	15,497	15,805
Bleached Hardwood	13,125	13,497	14,244	15,016	15,215
Unbleached	22,465	22,888	23,454	23,681	23,366
SEMICHEMICAL	4,753	4,688	4,714	4,713	4,706
MECHANICAL	6,636	6,869	6,944	6,989	6,931
SCREENINGS	4	4	5	5	5
Wood Pulp for Construction Paper & Board†	**737**	**712**	**691**	**691**	**691**
TOTAL MACHINE DRIED WOOD PULP	**11,310**	**11,701**	**12,132**	**12,951**	**12,995**
DISSOLVING	1,465	1,524	1,527	1,527	1,527
CHEMICAL PAPER GRADES	9,683	10,015	10,444	11,263	11,306
SULFITE PAPER GRADES	401	406	407	407	425
SULFATE PAPER GRADES	9,282	9,609	10,037	10,856	10,881
Bleached Softwood	5,510	5,751	6,007	6,580	6,649
Bleached Hardwood	3,567	3,665	3,838	4,084	4,039
Unbleached	204	192	192	192	192
ALL OTHER	161	161	161	161	161

** Capacity additions presented here for 1993 include only presently known commitments and do not necessarily represent final expansion plans of the industry for that year.*

† Excludes the defibrated/exploded pulp capacity of mills that produce hard pressed board.
Totals not adjusted for rounding differences.



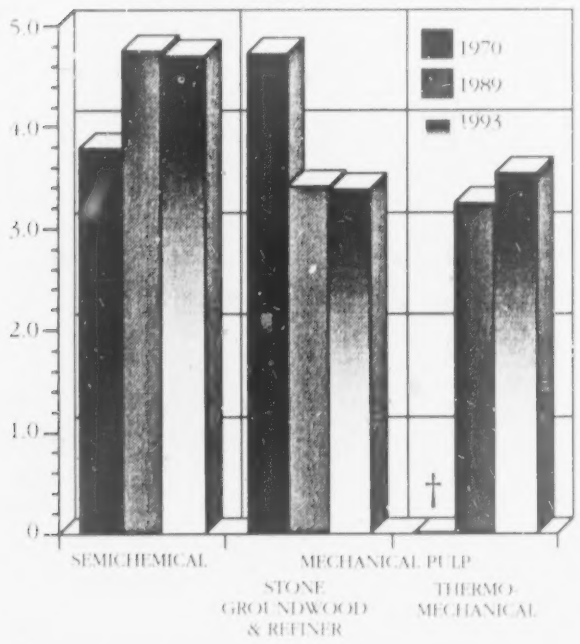
total wood pulp
GRADE DISTRIBUTION
1989



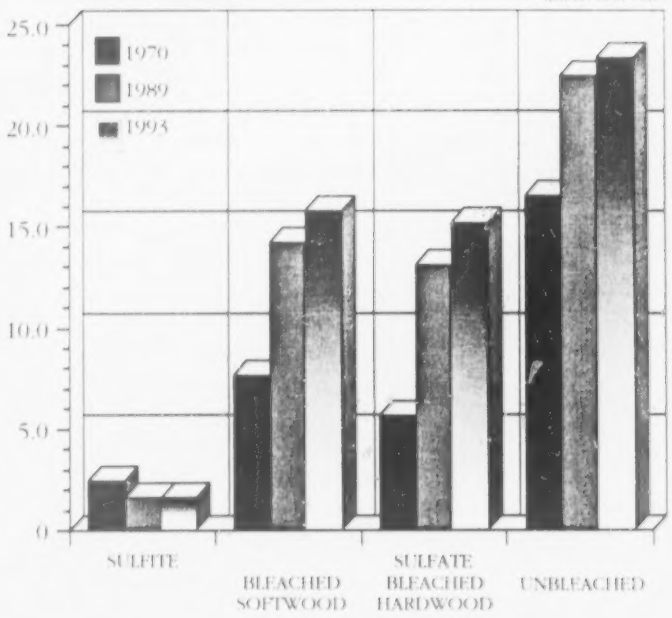
market wood pulp
GRADE DISTRIBUTION
1989

capacity/annual growth comparison

wood pulp
SEMICHEMICAL & MECHANICAL GRADES



wood pulp
CHEMICAL PAPER GRADES



† *Thermomechanical capacity introduced in 1975*

Practical Maximum Basis
Thousands short tons

market wood pulp

GRADES	1989	1990	1991	1992	1993*
TOTAL MARKET WOOD PULP	**9,047**	**9,400**	**9,786**	**10,606**	**10,643**
DISSOLVING	1,465	1,524	1,527	1,527	1,527
CHEMICAL PAPER GRADES	7,581	7,876	8,259	9,079	9,116
SULFITE PAPER GRADES	262	274	274	274	279
SULFATE PAPER GRADES	7,319	7,603	7,986	8,806	8,837
Bleached Softwood	4,249	4,522	4,734	5,325	5,412
Bleached Hardwood	2,902	2,925	3,096	3,325	3,270
Unbleached	168	156	156	156	155

* *Capacity additions presented here for 1993 include only presently known commitments and do not necessarily represent final expansion plans of the industry for that year.*

Totals not adjusted for rounding differences.

capacity summary annual

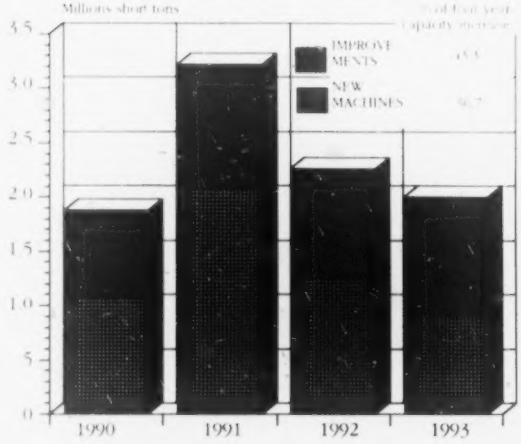
Based on information provided by producers. Reflects diversion of drying capacity to and from pulp use, installation of new equipment and retirement of existing equipment.

capacity/annual • year end • daily

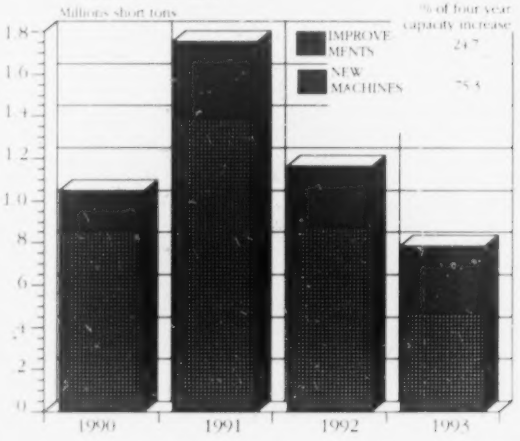
	ALL GRADES PAPER & PAPER-BOARD	PAPER & PAPER-BOARD		*Practical Maximum Basis*	PAPER	NEWS-PRINT	PRINTING & WRITING					
	Total	Total		*Thousands short tons*	Total	Total	Total	Uncoated Ground-wood	Coated Ground-wood	Coated Free Sheet	Uncoated Free Sheet	Co to Fi
ANNUAL CAPACITY 1989-1993	84,316	82,158	1989	Annual Capacity	41,165	6,296	23,637	1,874	4,341	3,503	12,092	2
Annual Capacity includes changes in capacity only for the portion of the year in which they are actually effective	1,077	1,077		New Machines	857	519	128	—	33	34	58	
	789	805		Net Improvements	190	13	177	51	23	101	(4)	
	86,181	**84,040**	1990	**Annual Capacity**	**42,212**	**6,828**	**23,942**	**1,924**	**4,398**	**3,638**	**12,145**	2
	2,077	2,077		New Machines	1,390	290	791	—	7	249	535	
	1,158	1,144		Net Improvements	367	32	357	(4)	148	137	37	
	89,416	**87,260**	1991	**Annual Capacity**	**43,969**	**7,151**	**25,089**	**1,920**	**4,553**	**4,023**	**12,717**	2
	1,250	1,250		New Machines	873	138	613	—	—	230	383	
	1,010	1,009		Net Improvements	293	46	216	9	43	133	3	
	91,676	**89,519**	1992	**Annual Capacity**	**45,135**	**7,335**	**25,918**	**1,929**	**4,596**	**4,386**	**13,104**	2
	913	913		New Machines	460	3	329	—	—	70	259	
	1,095	1,095		Net Improvements	327	92	241	4	32	101	35	
	93,683	**91,527**	1993*	**Annual Capacity**	**45,923**	**7,430**	**26,488**	**1,933**	**4,628**	**4,557**	**13,398**	2
YEAR END CAPACITY 1989-1993	**85,140**	**83,006**	**1989**	**Year End Capacity**	**41,747**	**6,620**	**23,759**	**1,977**	**4,303**	**3,517**	**12,112**	2
Year End Capacity is calculated by multiplying Daily Rate by number of Available Days	1,482	1,482		New Machines	981	360	367	—	26	126	216	
	1,026	1,014		Net Improvements	161	45	172	(62)	75	164	5	
	87,648	**85,502**	1990	**Year End Capacity**	**42,889**	**7,025**	**24,299**	**1,915**	**4,404**	**3,807**	**12,333**	2
	1,797	1,797		New Machines	1,215	229	768	—	—	214	554	
	1,085	1,074		Net Improvements	482	37	358	9	166	96	48	
	90,529	**88,373**	1991	**Year End Capacity**	**44,586**	**7,291**	**25,425**	**1,924**	**4,570**	**4,117**	**12,935**	2
	935	935		New Machines	621	12	495	—	—	236	259	
	933	933		Net Improvements	240	114	205	7	35	140	(6)	
	92,397	**90,240**	1992	**Year End Capacity**	**45,448**	**7,417**	**26,125**	**1,931**	**4,605**	**4,493**	**13,189**	2
	908	908		New Machines	424	—	296	—	—	12	284	
	1,061	1,061		Net Improvements	314	27	248	2	52	90	31	
	94,366	**92,209**	1993*	**Year End Capacity**	**46,186**	**7,444**	**26,669**	**1,934**	**4,657**	**4,595**	**13,504**	2
YEAR END DAILY RATE 1989-1993	354	355	1989	Available Days	356	360	357	357	353	358	358	3
	240.24	**233.56**		**Daily Rate**	**117.14**	**18.39**	**66.64**	**5.53**	**12.19**	**9.82**	**33.84**	0.6
	355	356	1990	Available Days	358	360	358	360	360	360	358	3
	247.12	**240.40**		**Daily Rate**	**119.97**	**19.49**	**67.81**	**5.32**	**12.22**	**10.58**	**34.48**	0.6
	355	356	1991	Available Days	358	360	358	360	360	360	358	3
	255.16	**248.41**		**Daily Rate**	**124.68**	**20.23**	**70.93**	**5.35**	**12.68**	**11.44**	**36.14**	0.6
	355	356	1992	Available Days	358	360	359	360	360	360	358	3
	260.37	**253.62**		**Daily Rate**	**127.06**	**20.58**	**72.87**	**5.37**	**12.78**	**12.48**	**36.84**	0.6
	355	356	1993*	Available Days	358	360	359	360	360	360	358	3
	265.90	**259.15**		**Daily Rate**	**129.11**	**20.65**	**74.37**	**5.37**	**12.93**	**12.76**	**37.71**	0.6

Thin Papers	Solid Bleached Bristols	PACKAGING & INDUSTRIAL CONVERTING Total	Un-bleached Kraft	Bleached Packaging & Industrial Converting	Specialty Packaging	Special Industrial	TISSUE Total
281	1,345	5,435	2,809	511	644	1,471	5,798
—	—	35	35	—	—	—	174
(11)	20	(31)	(49)	(21)	41	25	4
270	1,365	5,466	2,795	490	685	1,496	5,976
—	—	159	108	—	39	14	150
(9)	47	(10)	(89)	35	4	41	(13)
261	1,412	5,615	2,811	525	728	1,551	6,113
—	—	44	20	—	19	5	78
(3)	31	(12)	(59)	8	5	34	43
258	1,443	5,647	2,772	533	752	1,591	6,235
—	—	2	—	—	2	—	126
(3)	71	7	(25)	5	3	24	(12)
255	1,514	5,655	2,746	538	757	1,615	6,349
277	**1,372**	**5,440**	**2,793**	**475**	**678**	**1,494**	**5,927**
—	—	88	88	—	—	—	166
(7)	(4)	(12)	(60)	33	9	6	(44)
269	**1,369**	**5,516**	**2,821**	**508**	**687**	**1,500**	**6,049**
—	—	145	73	—	53	19	73
(9)	48	13	(57)	20	2	48	74
260	**1,416**	**5,674**	**2,838**	**528**	**742**	**1,567**	**6,196**
—	—	7	—	—	7	—	107
(2)	30	(61)	(106)	5	5	35	(18)
258	**1,446**	**5,621**	**2,732**	**533**	**754**	**1,602**	**6,285**
—	—	—	—	—	—	—	128
(3)	76	38	16	5	3	14	—
254	**1,522**	**5,659**	**2,748**	**538**	**757**	**1,616**	**6,413**
341	360	352	356	358	351	343	356
0.81	**3.81**	**15.45**	**7.84**	**1.33**	**1.93**	**4.35**	**16.66**
340	360	352	356	358	352	343	356
0.79	**3.80**	**15.67**	**7.92**	**1.42**	**1.95**	**4.37**	**16.99**
339	360	352	356	358	352	344	356
0.77	**3.93**	**16.11**	**7.97**	**1.48**	**2.11**	**4.56**	**17.40**
339	360	352	356	358	353	344	356
0.76	**4.01**	**15.96**	**7.67**	**1.49**	**2.14**	**4.66**	**17.66**
338	360	352	356	357	353	344	356
0.75	**4.23**	**16.07**	**7.72**	**1.51**	**2.15**	**4.70**	**18.01**

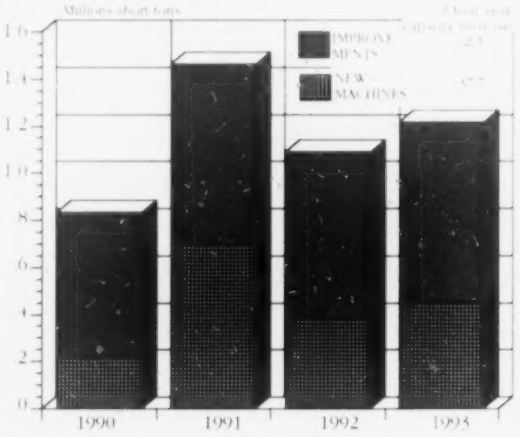
Annual Capacity Changes
TOTAL PAPER & PAPERBOARD



Annual Capacity Changes
TOTAL PAPER



Annual Capacity Changes
TOTAL PAPERBOARD



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Totals not adjusted for rounding differences

capacity/annual • year end • daily

Practical Maximum Basis

Thousands short tons

			PAPER-BOARD	UNBLEACHED KRAFT PAPERBOARD				SOLID BLEACHED PACKAGING PAPER BO				
			Total	Total	Liner-board	Folding	Other	Total	Liner-board	Folding	Milk Carton & Food Service	
ANNUAL CAPACITY 1989-1993	1989	Annual Capacity	40,993	20,878	19,192	1,183	503	4,716	194	2,298	1,961	
Annual Capacity includes changes in capacity only for the portion of the year in which they are actually effective		New Machines	220	132	88	44	—	—	—	—	—	
		Net Improvements	615	327	331	14	(18)	(98)	(2)	11	(105)	
	1990	**Annual Capacity**	**41,828**	**21,338**	**19,611**	**1,242**	**485**	**4,619**	**192**	**2,309**	**1,856**	
		New Machines	687	659	480	179	—	—	—	—	—	
		Net Improvements	777	184	180	3	1	225	(17)	175	59	
	1991	**Annual Capacity**	**43,292**	**22,180**	**20,271**	**1,424**	**485**	**4,843**	**175**	**2,484**	**1,915**	
		New Machines	377	302	240	62	—	75	—	75	—	
		Net Improvements	715	303	268	35	1	138	(16)	79	73	
	1992	**Annual Capacity**	**44,384**	**22,785**	**20,779**	**1,521**	**486**	**5,056**	**159**	**2,638**	**1,989**	
		New Machines	453	69	26	43	—	124	—	124	—	
		Net Improvements	767	(26)	(35)	8	1	109	2	27	69	
	1993*	**Annual Capacity**	**45,604**	**22,829**	**20,770**	**1,572**	**487**	**5,289**	**161**	**2,789**	**2,058**	
YEAR END CAPACITY 1989-1993	**1989**	**Year End Capacity**	**41,259**	**21,071**	**19,377**	**1,203**	**491**	**4,617**	**199**	**2,296**	**1,868**	
Year End Capacity is calculated by multiplying Daily Rate by number of Available Days		New Machines	501	412	279	133	—	—	—	—	—	
		Net Improvements	853	358	373	(9)	(7)	17	(13)	31	(14)	
	1990	**Year End Capacity**	**42,613**	**21,840**	**20,029**	**1,327**	**484**	**4,633**	**185**	**2,327**	**1,855**	
		New Machines	581	581	458	124	—	—	—	—	—	
		Net Improvements	592	61	52	7	1	244	(27)	174	96	
	1991	**Year End Capacity**	**43,786**	**22,483**	**20,540**	**1,458**	**485**	**4,878**	**159**	**2,500**	**1,951**	
		New Machines	314	168	96	72	—	146	—	146	—	
		Net Improvements	692	371	333	37	1	118	—	73	41	
	1992	**Year End Capacity**	**44,792**	**23,022**	**20,968**	**1,567**	**487**	**5,142**	**159**	**2,719**	**1,992**	
		New Machines	484	—	—	—	—	73	—	73	—	
		Net Improvements	747	(117)	(127)	10	1	118	3	25	71	
	1993*	**Year End Capacity**	**46,023**	**22,905**	**20,841**	**1,577**	**487**	**5,333**	**161**	**2,817**	**2,064**	
YEAR END DAILY RATE 1989-1993	**1989**	Available Days	354	357	357	355	360	361	356	361	361	
		Daily Rate	**116.42**	**59.09**	**54.33**	**3.39**	**1.36**	**12.79**	**0.56**	**6.36**	**5.17**	
	1990	Available Days	354	356	356	355	359	360	358	360	360	
		Daily Rate	**120.44**	**61.43**	**56.34**	**3.74**	**1.35**	**12.88**	**0.52**	**6.47**	**5.16**	
	1991	Available Days	354	356	356	355	359	360	359	360	360	
		Daily Rate	**123.73**	**63.23**	**57.78**	**4.10**	**1.35**	**13.56**	**0.44**	**6.95**	**5.42**	
	1992	Available Days	354	356	355	355	359	360	359	360	360	
		Daily Rate	**126.56**	**64.75**	**58.99**	**4.41**	**1.36**	**14.29**	**0.44**	**7.55**	**5.54**	
	1993*	Available Days	354	356	356	355	359	360	359	360	360	
		Daily Rate	**130.04**	**64.42**	**58.62**	**4.44**	**1.36**	**14.82**	**0.45**	**7.82**	**5.74**	

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ARD	SEMI-CHEMICAL PAPERBOARD	RECYCLED PAPERBOARD						CONSTRUCTION PAPER & BOARD & WET MACHINE BOARD			
her	Total	Total	Liner-board	Corru-gating Medium**	Folding	Set-up	Gypsum Wall Board Facing	Other	Total	Constuc-tion Paper	Wet Machine Board	Insu-lating Board
63	5,781	9,617	458	2,042	2,569	313	1,393	2,842	2,157	826	118	1,213
—	—	88	—	19	8	—	—	61	—	—	—	—
29	64	321	81	168	51	1	(20)	40	(16)	11	1	(28)
61	5,845	10,026	539	2,229	2,628	314	1,373	2,943	2,141	837	118	1,186
—	—	28	—	13	1	—	—	14	—	—	—	—
8	(33)	401	221	86	57	1	9	26	14	11	4	—
69	5,812	10,455	760	2,328	2,687	315	1,383	2,983	2,156	848	122	1,186
—	—	—	—	—	—	—	—	—	—	—	—	—
1	170	105	9	40	25	1	17	12	1	1	—	—
71	5,982	10,560	770	2,368	2,712	316	1,400	2,994	2,157	849	122	1,186
—	—	260	248	12	—	—	—	—	—	—	—	—
10	89	595	435	22	110	—	18	9	—	—	—	—
81	6,072	11,415	1,453	2,402	2,822	316	1,418	3,004	2,157	849	122	1,186
54	**5,831**	**9,740**	**463**	**2,107**	**2,587**	**311**	**1,391**	**2,881**	**2,134**	**829**	**118**	**1,187**
—	—	89	—	32	5	—	—	52	—	—	—	—
13	(82)	561	300	167	72	4	(19)	37	11	8	4	(1)
57	**5,749**	**10,390**	**763**	**2,306**	**2,664**	**315**	**1,372**	**2,970**	2,145	837	122	1,186
—	—	—	—	—	—	—	—	—	—	—	—	—
1	171	116	—	45	34	1	20	16	11	11	—	—
68	**5,920**	**10,505**	**763**	**2,351**	**2,698**	**316**	**1,392**	**2,986**	**2,157**	**849**	**122**	**1,186**
—	—	—	—	—	—	—	—	—	—	—	—	—
4	83	120	39	31	24	—	15	10	—	—	—	—
71	**6,004**	**10,625**	**802**	**2,382**	**2,722**	**316**	**1,408**	**2,996**	**2,157**	**849**	**122**	**1,186**
—	—	411	394	18	—	—	—	—	—	—	—	—
19	140	605	444	17	113	1	21	10	—	—	—	—
91	**6,144**	**11,641**	**1,640**	**2,417**	**2,835**	**316**	**1,428**	**3,006**	**2,157**	**849**	**122**	**1,186**
61	356	346	352	350	348	339	341	344	319	340	292	309
70	16.39	28.15	1.32	6.02	7.44	0.92	4.08	8.37	6.68	2.44	0.40	3.84
61	355	347	355	353	347	339	340	345	319	341	291	309
74	16.20	29.94	2.15	6.54	7.67	0.93	4.03	8.62	6.72	2.46	0.42	3.84
61	355	347	350	353	347	339	340	345	320	341	291	309
74	16.68	30.27	2.15	6.67	7.77	0.93	4.09	8.66	6.75	2.49	0.42	3.84
61	355	347	355	352	347	339	340	345	320	341	291	309
75	16.91	30.61	2.26	6.76	7.83	0.93	4.14	8.69	6.75	2.49	0.42	3.84
80	355	348	354	352	348	339	340	345	320	341	291	309
81	17.31	33.50	4.64	6.86	8.16	0.93	4.20	8.72	6.75	2.49	0.42	3.84

** Includes Container Chips & Filler

Totals not adjusted for rounding differences

capacity/annual • year end • daily

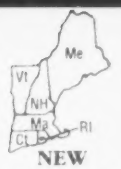
			ALL GRADES WOOD PULP	WOOD PULP FOR PAPER & BOARD	DISSOLVING	CHEMICAL PAPER GRADES					
							SULFITE			SULFATE	
										Bleached	
	Practical Maximum Basis										
	Thousands short tons		Total	Total	Total	Total	Total	Bleached	Unbleached	Total	Hardwood	Softwood
ANNUAL CAPACITY 1989-1993 Annual Capacity includes changes in capacity only for the portion of the year in which they are actually effective	1989	**Annual Capacity**	65,026	64,289	1,465	51,430	1,644	1,459	185	49,786	13,125	14,196
		New Machines	931	931	—	568	—	—	—	568	57	154
		Net Improvements	259	284	59	421	14	18	(4)	407	316	26
	1990	**Annual Capacity**	66,216	65,504	1,524	52,419	1,658	1,477	182	50,761	13,497	14,376
		New Machines	1,910	1,910	—	1,752	—	—	—	1,752	639	603
		Net Improvements	5	26	3	80	13	13	—	68	109	(97)
	1991	**Annual Capacity**	68,132	67,440	1,527	54,251	1,671	1,489	182	52,580	14,244	14,882
		New Machines	1,302	1,302	—	1,298	—	—	—	1,298	723	510
		Net Improvements	370	370	—	329	14	14	—	315	45	105
	1992	**Annual Capacity**	69,804	69,113	1,527	55,879	1,685	1,503	182	54,194	15,016	15,497
		New Machines	479	479	—	479	—	—	—	479	207	248
		Net Improvements	(399)	(399)	—	(334)	(46)	(46)	—	(287)	(8)	59
	1993*	**Annual Capacity**	69,884	69,193	1,527	56,024	1,638	1,457	182	54,386	15,215	15,805
YEAR END CAPACITY 1989-1993 Year End Capacity is calculated by multiplying Daily Rate by number of Available Days	1989	**Year End Capacity**	65,482	64,749	1,496	51,767	1,658	1,477	182	50,108	13,400	14,148
		New Machines	1,965	1,965	—	1,625	—	—	—	1,625	205	634
		Net Improvements	(357)	(316)	31	(88)	—	—	—	(88)	100	(89)
	1990	**Year End Capacity**	67,090	66,399	1,527	53,304	1,658	1,477	182	51,646	13,705	14,692
		New Machines	1,315	1,315	—	1,300	—	—	—	1,300	931	258
		Net Improvements	474	474	—	373	14	14	—	360	59	78
	1991	**Year End Capacity**	68,879	68,188	1,527	54,978	1,672	1,490	182	53,306	14,695	15,028
		New Machines	1,010	1,010	—	1,010	—	—	—	1,010	415	535
		Net Improvements	181	181	—	228	14	14	—	214	43	103
	1992	**Year End Capacity**	70,070	69,378	1,527	56,216	1,686	1,504	182	54,530	15,153	15,666
		New Machines	480	480	—	480	—	—	—	480	243	238
		Net Improvements	(362)	(362)	—	(370)	(52)	(52)	—	(319)	(64)	48
	1993*	**Year End Capacity**	70,187	69,496	1,527	56,326	1,634	1,452	182	54,691	15,332	15,951
YEAR END DAILY RATE 1989-1993	1989	Available Days	358	359	355	359	357	356	362	359	359	360
		Daily Rate	182.72	180.39	4.21	144.33	4.65	4.15	0.50	139.68	37.33	39.32
	1990	Available Days	358	359	355	359	357	356	362	359	359	360
		Daily Rate	187.18	184.97	4.30	148.59	4.65	4.15	0.50	143.94	38.18	40.84
	1991	Available Days	358	359	355	359	357	356	362	359	359	360
		Daily Rate	192.16	189.95	4.30	153.25	4.69	4.19	0.50	148.56	40.93	41.77
	1992	Available Days	358	359	355	359	357	356	362	359	359	360
		Daily Rate	195.49	193.28	4.30	156.70	4.73	4.22	0.50	151.98	42.19	43.56
	1993*	Available Days	358	359	355	359	357	356	362	359	359	360
		Daily Rate	195.79	193.58	4.30	156.98	4.58	4.08	0.50	152.40	42.68	44.36

** Capacity additions presented here for 1993 include only presently known commitments and do not necessarily represent final expansion plans of the industry for that year.*

Un-bleached	SEMICHEMICAL Total	SEMICHEMICAL Bleached	SEMICHEMICAL Un-bleached	MECHANICAL Total	MECHANICAL Stone-ground wood	MECHANICAL Refiner	MECHANICAL Thermo-mechanical	SCREEN-INGS Total	WOOD PULP FOR CONSTRUCTION PAPER & BOARD Total	Stone Ground-wood & Refiner	Defib-rated/ Exploded†
22,465	**4,753**	**376**	**4,377**	**6,636**	**3,037**	**354**	**3,245**	**4**	**737**	**220**	**517**
357	—	—	—	364	93	—	271	—	—	—	—
(6)	(65)	3	(68)	(131)	(70)	(10)	(50)	—	(26)	(23)	(3)
22,888	**4,688**	**379**	**4,309**	**6,869**	**3,059**	**344**	**3,466**	**4**	**712**	**197**	**515**
511	—	—	—	158	56	—	102	—	—	—	—
55	26	—	26	(83)	(64)	(10)	(9)	—	(20)	(20)	—
23,454	**4,714**	**379**	**4,334**	**6,944**	**3,052**	**334**	**3,558**	**5**	**691**	**177**	**515**
65	—	—	—	4	—	—	4	—	—	—	—
162	—	—	—	42	14	(9)	36	—	—	—	—
23,681	**4,713**	**379**	**4,334**	**6,989**	**3,066**	**325**	**3,599**	**5**	**691**	**177**	**515**
24	—	—	—	—	—	—	—	—	—	—	—
(339)	(7)	—	(7)	(58)	6	(9)	(56)	—	—	—	—
23,366	**4,706**	**379**	**4,327**	**6,931**	**3,072**	**316**	**3,543**	**5**	**691**	**177**	**515**
22,561	**4,671**	**379**	**4,292**	**6,812**	**3,063**	**354**	**3,394**	**4**	**732**	**218**	**515**
786	—	—	—	340	124	—	216	—	—	—	—
(99)	15	—	15	(274)	(180)	(20)	(74)	—	(41)	(41)	—
23,249	**4,685**	**379**	**4,306**	**6,878**	**3,008**	**334**	**3,537**	**5**	**691**	**177**	**515**
111	—	—	—	14	—	—	14	—	—	—	—
223	33	—	33	67	53	—	14	—	—	—	—
23,582	**4,719**	**379**	**4,339**	**6,960**	**3,061**	**334**	**3,565**	**5**	**691**	**177**	**515**
60	—	—	—	—	—	—	—	—	—	—	—
69	(14)	—	(14)	(33)	6	(17)	(22)	—	—	—	—
23,711	**4,704**	**379**	**4,325**	**6,926**	**3,067**	**316**	**3,543**	**5**	**691**	**177**	**515**
—	—	—	—	—	—	—	—	—	—	—	—
(303)	3	—	3	5	5	—	—	—	—	—	—
23,408	**4,707**	**379**	**4,328**	**6,932**	**3,073**	**316**	**3,543**	**5**	**691**	**177**	**515**
358	358	359	358	362	362	361	362	365	314	334	300
63.02	**13.03**	**1.06**	**11.98**	**18.80**	**8.46**	**0.98**	**9.37**	**0.01**	**2.33**	**0.65**	**1.68**
358	358	359	358	362	362	361	362	365	313	333	300
64.93	**13.07**	**1.06**	**12.02**	**19.00**	**8.31**	**0.92**	**9.77**	**0.01**	**2.21**	**0.53**	**1.68**
358	358	359	358	362	362	361	362	365	313	333	300
65.86	**13.17**	**1.06**	**12.11**	**19.23**	**8.45**	**0.92**	**9.85**	**0.01**	**2.21**	**0.53**	**1.68**
358	358	359	358	362	362	361	362	365	313	333	300
66.23	**13.13**	**1.06**	**12.07**	**19.13**	**8.47**	**0.88**	**9.79**	**1.68**	**2.21**	**0.53**	**1.68**
358	358	359	358	362	362	361	362	365	313	333	300
65.36	**13.13**	**1.06**	**12.08**	**19.15**	**8.49**	**0.88**	**9.79**	**0.01**	**2.21**	**0.53**	**1.68**

† Excludes the defibrated exploded pulp capacity of mills that produce hard pressed board — Totals not adjusted for rounding differences

paper & paperboard

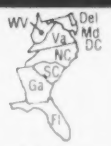
TOTAL U.S. CAPACITY		GRADES	 NEW ENGLAND		MID-ATLANTIC	
1989	1993	*Practical Maximum Basis/Thousands short tons*	1989	1993	1989	1993
84,316	**93,683**	**Total All Grades Paper & Paperboard**	**6,263**	**6,668**	**5,803**	**5,882**
82,158	**91,527**	**TOTAL PAPER & PAPERBOARD**	**6,209**	**6,614**	**5,440**	**5,553**
41,165	**45,923**	**Total Paper**	**5,297**	**5,616**	**4,002**	**4,021**
6,296	7,430	NEWSPRINT	n.a.	n.a.	n.a.	n.a.
23,637	26,488	PRINTING & WRITING	3,912	4,242	2,416	2,408
1,874	1,933	Uncoated Groundwood	668	607	n.a.	n.a.
4,341	4,628	Coated Groundwood	1,290	1,332	247	252
3,503	4,557	Coated Free Sheet	609	953	236	255
12,574	13,856	Uncoated Free Sheet (1)	1,335	1,339	1,759	1,750
1,345	1,514	Solid Bleached Bristols	11	12	13	13
5,435	5,655	PACKAGING & INDUSTRIAL CONVERTING	465	470	312	336
5,798	6,349	TISSUE	529	537	1,057	1,047
40,993	**45,604**	**Total Paperboard**	**911**	**889**	**1,438**	**1,532**
20,878	22,829	UNBLEACHED KRAFT	—	—	—	—
19,192	20,770	of which Kraft Linerboard	—	—	—	—
4,716	5,289	SOLID BLEACHED	—	—	—	—
5,781	6,072	SEMICHEMICAL	n.a.	n.a.	—	—
9,617	11,415	RECYCLED	799	889	1,438	1,532
2,500	3,855	Containerboard	90	144	298	388
7,117	7,559	All Other Recycled	709	745	1,140	1,144
2,157	**2,157**	**Total Construction Paper & Board**	**54**	**54**	**363**	**329**

wood pulp

65,026	**69,884**	**Total All Grades Wood Pulp**	**3,497**	**3,542**	**1,438**	**1,413**
64,289	**69,193**	**TOTAL WOOD PULP FOR PAPER & BOARD**	**3,411**	**3,497**	**1,437**	**1,413**
1,465	1,527	DISSOLVING	—	—	—	—
1,644	1,638	SULFITE PAPER GRADES	n.a.	n.a.	n.a.	n.a.
49,790	54,391	SULFATE PAPER GRADES	2,123	2,245	529	527
14,196	15,805	Bleached Softwood	623	685	152	148
13,125	15,215	Bleached Hardwood	1,438	1,496	377	380
22,469	23,371	Unbleached (2)	n.a.	n.a.	—	—
4,753	4,706	SEMICHEMICAL	n.a.	n.a.	430	400
6,636	6,931	MECHANICAL	1,013	981	175	180
737	**691**	**Wood Pulp for Construction Paper & Board (3)**	**86**	**45**	**1**	**—**

market pulp

9,047	**10,643**	**Total Market Pulp**	**404**	**428**	**—**	**—**
7,581	9,116	Chemical Paper Grades	404	428	—	—

EAST NORTH CENTRAL		WEST NORTH CENTRAL		 SOUTH ATLANTIC		EAST SOUTH CENTRAL		WEST SOUTH CENTRAL		MOUNTAIN & PACIFIC*	
1989	**1993**	**1989**	**1993**	**1989**	**1993**	**1989**	**1993**	**1989**	**1993**	**1989**	**1993**
13,137	**14,684**	**2,007**	**2,648**	**20,458**	**22,495**	**11,398**	**13,213**	**13,143**	**14,686**	**12,105**	**13,406**
12,893	**14,438**	**1,835**	**2,456**	**19,961**	**21,991**	**10,992**	**12,806**	**12,815**	**14,354**	**12,013**	**13,314**
8,013	**8,931**	**1,322**	**1,931**	**6,573**	**7,361**	**4,617**	**5,306**	**5,713**	**6,310**	**5,628**	**6,447**
n.a.	n.a.	—	—	1,115	1,324	1,207	1,593	1,264	1,333	1,915	2,388
5,431	5,938	1,294	1,902	3,353	4,010	2,526	2,769	2,748	3,227	1,956	1,994
283	296	n.a.	n.a.	n.a.	n.a.	127	213	n.a.	n.a.	244	249
1,303	1,340	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	56	49
1,215	1,690	n.a.	n.a.	n.a.	n.a.	354	515	n.a.	n.a.	186	199
2,496	2,468	204	512	1,993	2,597	1,759	1,746	1,603	1,991	1,427	1,454
134	144	—	—	541	584	n.a.	n.a.	524	632	43	43
953	1,135	n.a.	n.a.	1,416	1,207	207	235	1,268	1,258	785	985
1,443	1,662	—	—	689	820	676	710	432	492	971	1,081
4,880	**5,508**	**513**	**525**	**13,388**	**14,630**	**6,375**	**7,500**	**7,102**	**8,045**	**6,385**	**6,867**
—	—	—	—	8,923	9,365	4,155	4,936	4,358	5,005	3,442	3,522
—	—	—	—	8,335	8,777	3,691	4,141	3,753	4,355	3,414	3,496
n.a.	n.a.	—	—	1,865	2,148	836	866	1,473	1,681	541	594
1,889	1,868	n.a.	n.a.	1,225	1,328	943	1,063	846	880	691	750
2,990	3,639	438	449	1,376	1,790	441	635	425	478	1,710	2,001
763	1,165	145	146	219	603	—	131	63	69	922	1,209
2,227	2,474	293	303	1,157	1,187	441	504	362	409	788	792
244	**246**	**173**	**192**	**497**	**503**	**406**	**407**	**328**	**332**	**92**	**92**
4,122	**4,116**	**841**	**1,045**	**20,501**	**21,875**	**11,977**	**14,142**	**11,871**	**12,606**	**10,779**	**11,145**
4,040	**4,036**	**793**	**1,000**	**20,297**	**21,671**	**11,832**	**13,996**	**11,765**	**12,500**	**10,714**	**11,081**
—	—	—	—	540	553	n.a.	n.a.	—	—	676	678
359	339	—	—	—	—	—	—	—	—	799	813
1,773	1,793	327	459	17,824	19,356	9,851	11,731	10,046	10,754	7,316	7,526
416	414	n.a.	n.a.	4,891	5,304	2,403	3,305	2,495	2,564	3,132	3,254
119	1,133	n.a.	n.a.	3,718	4,720	3,509	4,029	2,500	2,886	230	252
n.a.	n.a.	n.a.	n.a.	9,215	9,332	3,938	4,398	5,051	5,304	3,954	4,020
1,412	1,383	n.a.	n.a.	916	924	679	662	657	664	518	532
496	521	415	490	1,017	837	1,052	1,307	1,062	1,082	1,406	1,532
81	**80**	**48**	**46**	**204**	**204**	**146**	**146**	**106**	**106**	**64**	**64**
n.a.	**n.a.**	**—**	**—**	**3,609**	**4,216**	**1,980**	**2,824**	**741**	**854**	**2,033**	**2,112**
n.a.	n.a.	—	—	3,070	3,662	1,731	2,528	741	854	1,357	1,434

(1) Includes cotton fibers and thin papers.

(2) Includes screenings.

(3) Excludes defibrated exploded pulp capacity of mills that produce hard pressed board.

N.A. — Not Available.

Totals not adjusted for rounding differences.

**Includes Alaska.*

Thousands metric tons

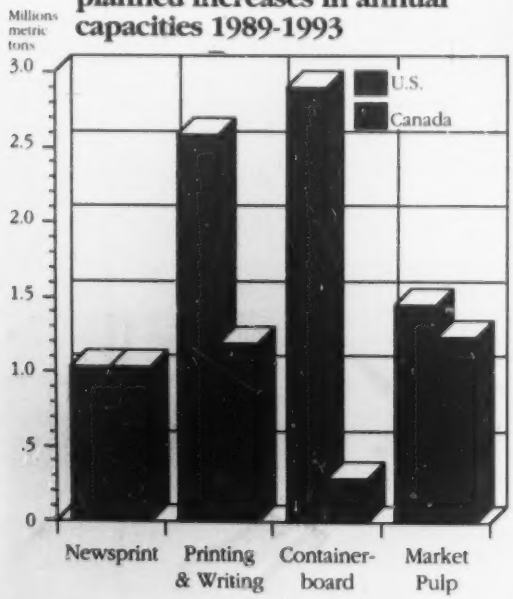
wood pulp (except defibrated/exploded & screenings)

	TOTALS			MECHANICAL		SEMICHEMICAL		CHEMICAL PAPER GRADES		
	1989	1993	Percent Increase	1989	1993	1989	1993	1989	1993	of which 1989
WORLD TOTAL	**169,246**	**189,735**	**12.1**	41,947	47,655	9,364	9,612	112,687	127,094	30,920
DEVELOPED MARKET ECONOMIES	**138,780**	**153,226**	**10.4**	35,605	40,035	7,507	7,507	92,177	102,107	24,631
NORTH AMERICA	**84,254**	**92,278**	9.5	17,760	20,217	4,786	4,786	60,108	65,639	14,324
U.S.	**58,518**	**62,928**	7.5	6,220	6,448	4,269	4,269	46,657	50,825	6,878
Canada	**25,736**	**29,350**	14.0	11,540	13,769	464	517	13,451	14,814	7,446
JAPAN	**13,471**	**15,658**	16.2	3,305	3,456	1,002	1,002	8,839	10,875	778
WESTERN EUROPE	**36,491**	**40,588**	11.2	12,864	14,599	1,169	1,259	21,280	25,554	8,839
E.E.C.	**7,379**	**8,869**	20.2	3,750	4,438	311	311	3,171	3,887	1,133
Nordic Countries	**22,880**	**24,895**	8.8	8,140	8,860	790	880	13,230	14,515	5,135
Rest of Western Europe	**6,232**	**6,824**	9.5	974	1,301	68	68	4,879	5,132	2,571
OCEANIA	**2,694**	**2,832**	5.1	1,306	1,393	354	296	1,034	1,143	300
OTHERS	**1,870**	**1,870**	—	370	370	164	164	916	916	390
DEVELOPING MARKET ECONOMIES	**11,432**	**17,145**	**50.0**	**1,989**	**3,096**	**766**	**951**	**8,279**	**12,650**	**2,991**
AFRICA	**982**	**1,112**	13.2	119	130	142	157	691	795	305
LATIN AMERICA	**7,654**	**12,539**	63.8	1,140	2,033	317	327	6,099	10,081	2,341
of which Brazil	**4,732**	**8,048**	70.1	555	1,097	60	60	4,033	6,807	1,576
Mexico	**855**	**898**	5.0	295	295	—	—	560	603	—
ASIA	**2,796**	**3,494**	25.0	730	933	307	467	1,489	1,774	345
CENTRALLY PLANNED ECONOMIES	**19,034**	**19,364**	**1.7**	**4,353**	**4,524**	**1,133**	**1,154**	**12,231**	**12,337**	**3,298**
of which USSR	**12,145**	**12,415**	2.2	2,850	3,000	635	635	7,900	8,000	2,660

Totals not adjusted for rounding differences. **No data available for 1993.*

NORTH AMERICA

planned increases in annual capacities 1989-1993



market wood pulp

NORTH AMERICA	1989	1990	1991	1992
TOTAL MARKET WOOD PULP	**17,024**	**17,548**	**18,669**	**19,673**
DISSOLVING	1,610	1,640	1,635	1,635
CHEMICAL PAPER GRADES	14,324	14,792	15,564	16,438
Sulfite	581	598	596	589
Sulfate	13,743	14,194	14,968	15,849
MECHANICAL	1,090	1,116	1,470	1,600

** Canadian capacity changes for 1993 not available.*

Source: Food and Agriculture Organization of the United Nations, Canadian Pulp & Paper Association, American Paper Institute.

Thousands metric tons

paper & paperboard (except insulating & hard pressed board)

market 1992*	DISSOLVING 1989	DISSOLVING 1993	TOTALS 1989	TOTALS 1993	Percent Increase	NEWSPRINT 1989	NEWSPRINT 1993	PRINTING & WRITING 1989	PRINTING & WRITING 1993	WRAPPING & PACKAGING 1989	WRAPPING & PACKAGING 1993	ALL OTHERS 1989	ALL OTHERS 1993
33,556	**5,248**	**5,373**	**250,755**	**285,531**	**13.9**	**34,829**	**40,581**	**71,333**	**85,234**	**112,737**	**125,604**	**31,856**	**34,112**
25,240	**3,533**	**3,576**	**192,332**	**220,321**	**14.6**	**28,958**	**33,668**	**58,483**	**70,581**	**83,262**	**92,508**	**21,629**	**23,564**
16,438	1,610	1,635	93,004	104,415	12.3	15,732	17,791	25,102	28,877	42,046	47,399	9,524	10,348
8,257	1,329	1,385	75,390	83,914	11.3	5,712	6,741	21,443	24,030	39,265	43,520	8,970	9,623
8,201	281	250	17,614	20,501	16.4	10,020	11,050	3,659	4,847	3,381	3,879	554	725
922	325	325	28,847	34,613	20.0	3,412	4,274	8,870	12,110	12,132	13,179	4,433	5,050
7,190	1,178	1,196	65,601	76,328	16.4	8,547	10,351	23,745	28,801	26,086	29,529	7,223	7,647
1,172	147	233	34,635	39,981	15.4	2,801	4,082	13,189	15,363	14,218	15,772	4,427	4,764
3,460	720	640	20,315	23,430	15.3	4,820	4,965	7,225	9,215	6,985	7,850	1,285	1,400
2,558	311	323	10,651	12,917	21.3	926	1,304	3,331	4,223	4,883	5,907	1,511	1,483
300	—	—	2,814	2,879	2.3	825	810	398	417	1,330	1,330	261	322
590	420	420	2,066	2,086	1.0	442	442	368	376	1,068	1,071	188	197
5,018	**398**	**448**	**26,100**	**31,546**	**20.9**	**2,716**	**3,757**	**6,480**	**8,043**	**14,233**	**16,851**	**2,671**	**2,895**
310	30	30	1,208	1,518	25.7	132	248	441	525	521	628	114	117
4,063	98	98	13,055	16,055	23.0	1,193	1,758	2,887	3,952	7,116	8,309	1,859	2,036
2,434	84	84	5,457	7,713	41.3	241	472	1,452	2,377	3,103	4,063	661	801
—	—	—	3,613	3,872	7.2	420	520	635	649	2,042	2,187	516	516
645	270	320	11,837	13,973	18.0	1,391	1,751	3,152	3,566	6,596	7,914	698	742
3,298	**1,317**	**1,349**	**32,323**	**33,664**	**4.1**	**3,155**	**3,156**	**6,370**	**6,610**	**15,242**	**16,245**	**7,556**	**7,653**
2,660	760	780	11,850	12,800	8.0	1,950	1,950	1,400	1,500	6,250	6,980	2,250	2,370

Thousands metric tons

1993*	Percent Increase
19,706	**15.8**
1,635	1.5
16,471	15.0
594	2.2
15,877	15.5
1,600	46.8

Thousands metric tons

paper & paperboard (except insulating & hard pressed board)

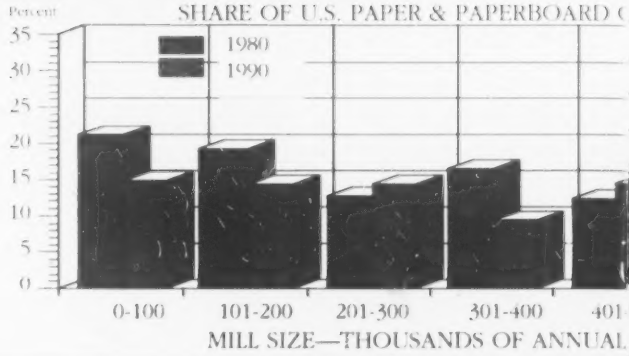
NORTH AMERICA	1989	1990	1991	1992	1993	Percent Increase
TOTAL PAPER AND PAPERBOARD	**93,004**	**95,716**	**99,797**	**102,207**	**104,415**	**12.3**
PAPER	**52,108**	**53,806**	**56,371**	**57,862**	**58,840**	**12.9**
NEWSPRINT	15,732	16,264	17,087	17,554	17,791	13.1
PRINTING & WRITING	25,102	25,960	27,391	28,259	28,877	15.0
Wood Containing	7,862	8,296	8,726	8,854	8,973	14.1
Wood Free	17,240	17,669	18,665	19,405	19,904	15.4
TISSUE	5,785	6,039	6,210	6,340	6,485	12.6
PACKAGING & IND. CONV.	5,489	5,537	5,683	5,708	5,715	4.1
PAPERBOARD	**40,896**	**41,910**	**43,426**	**44,345**	**45,574**	**11.4**
CONTAINERBOARD	27,155	28,015	28,951	29,614	30,346	11.8
Linerboard	19,299	19,908	20,761	21,227	21,843	13.2
Corrugating	7,856	8,107	8,190	8,388	8,503	8.2
ALL OTHER PAPERBOARD	13,741	13,894	14,475	14,731	15,228	10.8

Totals not adjusted for rounding differences

mill size-paper, paperboard & wood pulp

ANNUAL CAPACITY RANGE*	PAPER & PAPERBOARD		WOOD PULP	
	Number of Mills	Share of Total Capacity	Number of Mills	Share of Total Capacity
TOTAL	538	100%	214	100%
0-25	125	2.0	14	0.3
26-50	84	3.7	13	0.8
51-75	69	5.2	13	1.3
76-100	39	4.1	11	1.4
101-125	29	3.9	14	2.4
126-150	24	3.9	10	2.1
151-175	13	2.5	8	2.0
176-200	18	4.1	6	1.7
201-250	28	7.4	22	7.5
251-300	21	6.9	12	5.1
301-350	9	3.5	11	5.5
351-400	13	5.8	11	6.3
401-450	10	5.0	9	5.9
451-500	17	9.5	14	10.3
over 500	39	32.5	46	47.2

* Thousands short tons



SHARE OF U.S. PAPER & PAPERBOARD C

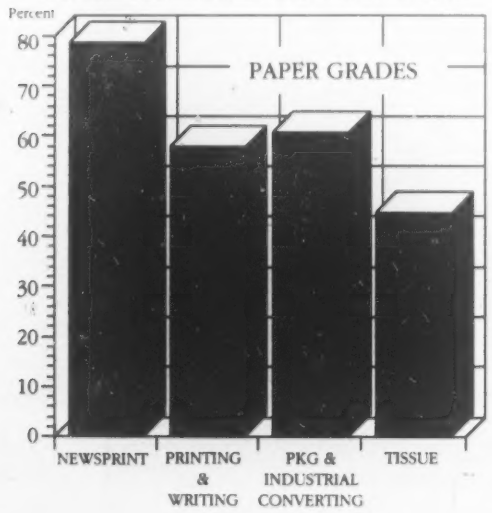
size of machines-by princip

paper

Machine Annual Capacity Thousands short tons	NEWSPRINT		PRINTING & WRITING	
	Number of Machines	Share of Total Capacity	Number of Machines	Share Tota Capac
TOTAL	40	100%	421	100%
0-5	—	—	30	1
6-10	—	—	33	1
11-15	—	—	24	1
16-20	—	—	19	1
21-30	—	—	55	6
31-40	1	1	50	7
41-50	1	1	32	6
51-75	4	4	64	17
76-100	3	4	33	12
101-125	2	4	21	10
126-150	14	33	15	8
151-200	7	21	24	18
201-250	6	23	13	10
251-300	2	9	2	2
301-400	—	—	—	—
over 400	—	—	—	—

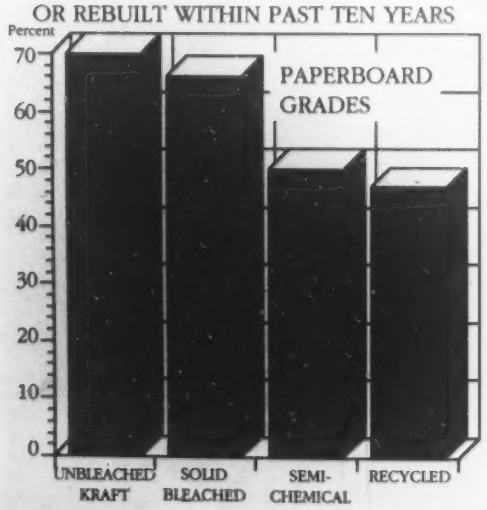
All data based on machines in place January 1989.

SHARE OF MACHINE CAPACITY INSTALLED OR REBUILT WITHIN PAST TEN YEARS



MACHINES
paper & paperboard

SHARE OF MACHINE CAPACITY INSTALLED OR REBUILT WITHIN PAST TEN YEARS

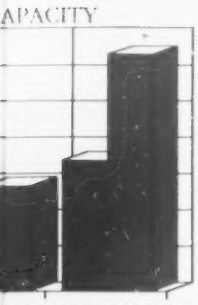


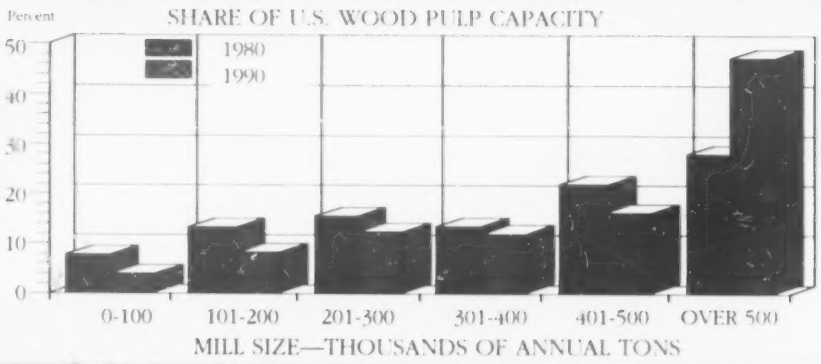
age of machines-by principal grade produced

paper

Year Machine Installed or Rebuilt*	TOTAL U.S.		NEWSPRINT		PRINTING & WRITING		PACKA IND
	Number of Machines	Share of Total Capacity	Number of Machines	Share of Total Capacity	Number of Machines	Share of Total Capacity	Numbe of Machine
TOTAL	1,218		40		419		176
No Data Available	170		1		57		18
Total Sample	1,048	100%	39	100%	362	100%	158
1988	83	13	5	14	27	10	7
1987	49	6	3	7	18	5	5
1986	52	9	2	4	22	10	8
1985	57	6	3	7	21	6	8
1984	38	4	5	9	16	6	4
1983	37	3	3	4	12	4	9
1982	41	4	2	4	18	5	10
1981	42	5	3	11	13	4	6
1976-1980	169	18	6	23	61	17	18
1971-1975	120	11	3	8	34	10	19
1966-1970	124	9	2	5	41	11	25
1961-1965	96	6	—	—	42	9	15
1956-1960	37	2	2	4	13	1	5
1951-1955	26	1	—	—	9	1	5
Prior to 1951	77	3	—	—	15	1	14

All data based on machines in place January 1989.





MILLS
paper, paperboard & wood pulp

al grade produced

	PACKAGING & IND. CONV.		TISSUE	
of ity	Number of Machines	Share of Total Capacity	Number of Machines	Share of Total Capacity
	176	100%	203	100%
	29	1	15	1
	41	6	25	3
	22	5	24	6
	20	6	23	7
	22	9	34	15
	6	4	31	19
	5	4	24	19
	5	5	25	27
	5	8	2	3
	7	13	—	—
	6	14	—	—
	6	17	—	—
	1	3	—	—
	—	—	—	—
	1	5	—	—
	—	—	—	—

paperboard

Machine Annual Capacity Thousands short tons	UNBLEACHED KRAFT		SOLID BLEACHED		SEMICHEMICAL		RECYCLED		CONSTRUCTION	
	Number of Machines	Share of Total Capacity	Number of Machines	Share of Total Capacity	Number of Machines	Share of Total Capacity	Number of Machines	Share of Total Capacity	Number of Machines	Share of Total Capacity
TOTAL	67	100%	26	100%	38	100%	187	100%	62	100%
0-5	—	—	—	—	—	—	7	1	9	1
6-10	—	—	—	—	—	—	2	1	7	3
11-15	—	—	—	—	—	—	7	1	5	3
16-20	—	—	—	—	—	—	11	2	5	4
21-30	—	—	—	—	—	—	30	8	9	10
31-40	—	—	—	—	1	1	28	10	6	9
41-50	—	—	1	1	—	—	25	12	6	12
51-75	—	—	2	3	5	6	46	29	6	18
76-100	2	1	—	—	2	3	16	14	7	28
101-125	1	1	—	—	8	16	7	8	1	6
126-150	2	1	1	3	7	16	3	4	1	6
151-200	9	8	12	40	7	21	3	5	—	—
201-250	12	14	6	25	3	11	1	2	—	—
251-300	7	10	2	10	3	14	1	3	—	—
301-400	24	42	1	7	2	12	—	—	—	—
over 400	10	23	1	11	—	—	—	—	—	—

GING & CONV.		TISSUE	
	Share of Total Capacity	Number of Machines	Share of Total Capacity
		203	
		38	
100%		165	100%
7		7	6
5		4	5
12		4	3
5		9	8
6		5	3
5		6	4
10		2	1
8		7	6
9		33	19
7		11	7
11		30	19
4		23	12
1		6	2
3		1	1
7		17	4

paperboard — Construction Grades

Year Machine Installed or Rebuilt*	UNBLEACHED KRAFT		SOLID BLEACHED		SEMICHEMICAL		RECYCLED		CONSTRUCTION	
	Number of Machines	Share of Total Capacity	Number of Machines	Share of Total Capacity	Number of Machines	Share of Total Capacity	Number of Machines	Share of Total Capacity	Number of Machines	Share of Total Capacity
TOTAL	67		26		38		187		62	
No Data Available	—		—		—		32		24	
Total Sample	67	100%	26	100%	38	100%	155	100%	38	100%
1988	15	24	5	15	4	14	15	5	—	—
1987	3	3	2	9	5	15	8	8	1	2
1986	5	8	4	26	2	6	4	3	1	—
1985	4	7	1	4	—	—	11	8	—	—
1984	2	2	—	—	1	2	4	3	1	6
1983	1	2	—	—	—	—	5	3	1	—
1982	2	3	1	4	1	4	5	5	—	—
1981	3	5	—	—	1	6	8	5	1	7
1976-1980	15	23	4	14	8	19	19	16	5	10
1971-1975	4	5	4	15	10	22	25	18	12	10
1966-1970	4	7	1	4	4	8	15	9	4	9
1961-1965	3	4	2	7	1	2	7	5	5	8
1956-1960	1	1	2	2	1	2	4	3	3	9
1951-1955	2	3	—	—	—	—	8	4	1	1
Prior to 1951	3	3	—	—	—	—	23	10	5	11

*Rebuilds include only modifications which significantly extended the useful life or increased the capacity of a machine.

Thousands short tons

fiber consumption in paper & paperboard manufacture

	Total U.S.	Percent of Total Fiber	New England	Mid-Atlantic	East North Central	West North Central	South Atlantic	East South Central	West South Central	Mountain & Pacific
1989										
TOTAL FIBER	**80,755**	**100.0**	**5,502**	**5,230**	**12,276**	**1,676**	**19,727**	**11,030**	**13,164**	**12,149**
TOTAL WOOD PULP	59,994	74.3	4,050	2,775	6,485	1,082	16,115	9,435	11,275	8,780
Manufactured on-site	50,452	62.5	2,387	1,221	2,937	711	15,362	9,060	11,054	7,720
*Purchased	6,594	8.2	938	1,225	2,668	271	456	297	102	637
*Transferred	2,948	3.7	725	329	878	99	297	78	118	423
†TOTAL WASTE PAPER	20,442	25.3	1,368	2,398	5,747	575	3,605	1,574	1,814	3,360
Mixed Papers	2,356	2.9	179	293	701	97	433	198	192	262
Newspapers	3,638	4.5	194	700	963	81	634	80	189	797
Corrugated	9,993	12.4	443	695	2,503	330	2,084	1,069	864	2,005
Pulp Substitutes	2,642	3.3	384	456	661	47	309	213	318	254
High Grade Deinking	1,812	2.2	169	253	920	20	144	14	251	42
OTHER FIBERS	318	0.4	84	56	46	20	7	21	75	9
1990										
TOTAL FIBER	**83,783**	**100.0**	**5,689**	**5,375**	**12,735**	**1,803**	**20,531**	**11,637**	**13,388**	**12,624**
TOTAL WOOD PULP	61,424	73.3	4,161	2,835	6,513	1,195	16,528	9,831	11,420	8,942
Manufactured on-site	51,839	61.9	2,497	1,206	2,994	789	15,787	9,487	11,176	7,903
*Purchased	6,591	7.9	975	1,299	2,614	318	447	248	93	598
*Transferred	2,993	3.6	689	330	906	89	294	96	150	440
†TOTAL WASTE PAPER	22,044	26.3	1,443	2,485	6,176	588	3,996	1,786	1,897	3,674
Mixed Papers	2,583	3.1	178	299	755	107	497	221	226	300
Newspapers	4,096	4.9	199	739	1,025	85	885	82	204	878
Corrugated	10,731	12.8	501	762	2,616	336	2,173	1,228	915	2,199
Pulp Substitutes	2,709	3.2	399	431	716	40	304	225	339	255
High Grade Deinking	1,925	2.3	165	254	1,064	20	138	30	212	42
OTHER FIBERS	314	0.4	85	56	46	20	7	21	71	9
1991										
TOTAL FIBER	**87,831**	**100.0**	**5,995**	**5,554**	**13,444**	**1,969**	**21,712**	**12,247**	**13,835**	**13,075**
TOTAL WOOD PULP	63,664	72.5	4,332	2,831	6,758	1,349	17,242	10,224	11,737	9,192
Manufactured on-site	53,968	61.4	2,674	1,200	3,127	929	16,490	9,919	11,470	8,160
*Purchased	6,614	7.5	1,001	1,295	2,675	337	441	186	95	585
*Transferred	3,083	3.5	657	336	956	83	312	119	172	448
†TOTAL WASTE PAPER	23,826	27.1	1,563	2,666	6,638	600	4,463	2,003	2,019	3,873
Mixed Papers	2,723	3.1	187	320	774	109	534	232	229	338
Newspapers	4,457	5.1	208	771	1,093	86	1,005	112	226	956
Corrugated	11,593	13.2	534	832	2,848	344	2,394	1,368	996	2,277
Pulp Substitutes	2,950	3.4	463	457	770	41	361	246	353	259
High Grade Deinking	2,103	2.4	171	285	1,153	21	169	45	216	43
OTHER FIBERS	341	0.4	100	57	48	19	7	21	79	10
1992										
TOTAL FIBER	**90,620**	**100.0**	**6,137**	**5,679**	**13,849**	**2,138**	**22,479**	**12,655**	**14,197**	**13,486**
TOTAL WOOD PULP	64,897	71.6	4,406	2,883	6,923	1,494	17,651	10,284	11,943	9,313
Manufactured on-site	54,981	60.7	2,726	1,212	3,158	1,004	16,892	10,023	11,654	8,312
*Purchased	6,645	7.3	1,005	1,329	2,732	340	425	173	98	542
*Transferred	3,271	3.6	675	342	1,033	150	334	89	191	459
†TOTAL WASTE PAPER	25,362	28.0	1,630	2,738	6,878	623	4,821	2,349	2,159	4,163
Mixed Papers	2,875	3.2	190	328	810	114	552	260	247	374
Newspapers	4,994	5.5	213	794	1,115	91	1,147	273	273	1,087
Corrugated	12,151	13.4	543	847	2,980	356	2,554	1,506	1,048	2,317
Pulp Substitutes	3,077	3.4	475	471	792	41	380	258	373	287
High Grade Deinking	2,264	2.5	209	297	1,182	21	188	52	217	98
OTHER FIBERS	361	0.4	101	58	48	21	7	22	94	10

** Comprises all dried, wet, lap or slush pulp not produced on-site including transfers from company or affiliated mills.*

† Includes construction grades and molded pulp products

Thousands short tons

fiber consumption in paper & paperboard manufacture (continued)

	Total U.S.	Percent of Total Fiber	New England	Mid-Atlantic	East North Central	West North Central	South Atlantic	East South Central	West South Central	Mountain & Pacific
1993										
TOTAL FIBER	**92,672**	**100.0**	**6,216**	**5,711**	**14,135**	**2,215**	**22,785**	**12,951**	**14,600**	**14,060**
TOTAL WOOD PULP	65,151	70.3	4,435	2,869	6,976	1,566	17,512	10,316	12,054	9,425
Manufactured on site	54,993	59.3	2,750	1,212	3,146	1,031	16,701	10,047	11,754	8,352
*Purchased	6,796	7.3	1,008	1,334	2,786	374	426	173	99	596
*Transferred	3,362	3.6	677	322	1,044	161	384	96	201	477
TOTAL WASTE PAPER	27,148	29.3	1,680	2,787	7,110	628	5,266	2,613	2,438	4,626
Mixed Papers	3,007	3.2	193	329	865	114	556	271	272	407
Newspapers	5,353	5.8	222	797	1,179	91	1,157	323	377	1,207
Corrugated	13,298	14.3	546	854	3,030	359	3,018	1,706	1,192	2,593
Pulp Substitutes	3,177	3.4	499	507	852	42	542	257	375	522
High Grade Deinking	2,313	2.5	219	299	1,204	21	193	56	223	98
OTHER FIBERS	374	0.4	101	55	49	21	7	22	109	10

Thousands of cords

pulpwood consumption in wood pulp manufacture

	Total U.S.	Percent of Total Fiber	New England	Mid-Atlantic	East North Central	West North Central	South Atlantic	East South Central	West South Central	Mountain & Pacific
1989										
TOTAL PULPWOOD	**97,611**	**100.0**	**5,247**	**2,395**	**5,481**	**1,115**	**30,228**	**17,866**	**18,039**	**17,242**
Roundwood & Roundwood Chips	60,981	62.5	4,425	2,027	4,351	953	20,586	13,387	12,566	2,686
Forest Residues	4,900	5.0	—	103	453	33	1,543	1,177	1,999	591
Manufacturing Residues	31,731	32.5	822	264	677	128	8,099	3,302	3,474	13,965
1990										
TOTAL PULPWOOD	**100,052**	**100.0**	**5,376**	**2,397**	**5,628**	**1,157**	**30,699**	**18,726**	**18,370**	**17,699**
Roundwood & Roundwood Chips	62,502	62.5	4,518	2,049	4,491	1,012	20,904	13,889	12,656	2,983
Forest Residues	4,639	4.6	—	84	425	36	1,267	1,168	1,454	293
Manufacturing Residues	32,911	32.9	858	264	712	105	8,528	3,668	4,260	14,423
1991										
TOTAL PULPWOOD	**104,347**	**100.0**	**5,602**	**2,307**	**5,720**	**1,391**	**31,995**	**20,009**	**19,108**	**18,214**
Roundwood & Roundwood Chips	65,347	62.6	4,659	1,956	4,698	1,250	21,984	14,702	13,222	3,137
Forest Residues	4,776	4.6	—	87	454	37	1,366	1,198	1,514	261
Manufacturing Residues	34,224	32.8	962	264	568	124	8,711	4,242	4,372	13,815
1992										
TOTAL PULPWOOD	**107,307**	**100.0**	**5,694**	**2,363**	**5,766**	**1,524**	**33,102**	**20,866**	**19,639**	**18,355**
Roundwood & Roundwood Chips	67,697	63.1	4,700	1,994	4,644	1,361	22,980	15,248	14,652	2,917
Forest Residues	4,827	4.5	—	90	452	38	1,411	1,218	1,505	1,383
Manufacturing Residues	34,783	32.4	994	279	669	124	8,911	4,400	4,482	14,055
1993										
TOTAL PULPWOOD	**107,778**	**100.0**	**5,704**	**2,372**	**5,699**	**1,514**	**32,912**	**21,486**	**19,695**	**18,398**
Roundwood & Roundwood Chips	67,933	63.0	4,813	2,062	4,575	1,452	22,705	15,591	15,210	4,525
Forest Residues	4,906	4.6	—	90	452	38	1,434	1,305	1,572	1,014
Manufacturing Residues	34,939	32.4	891	279	672	124	8,903	4,590	4,411	12,859

FIBER CONSUMPTION DEFINITIONS

1989 — Actual consumption
1990 — Best estimate based on year-to-date reporting
1991-1993 — Consumption at capacity at 85% of production

Total may not add due to rounding differences

Thousands short tons

actual consumption

END PRODUCTS	1989 Total	Mixed Papers	Newspapers	Corrugated	Pulp Substitutes	High Grade Deinking
TOTAL ALL GRADES	**20,442**	2,356	3,638	9,993	2,642	1,812
TOTAL PAPER	**5,790**	347	1,964	210	1,681	1,588
NEWSPRINT	1,499	28	1,471	—	—	—
PRINTING & WRITING	1,352	37	13	61	921	319
PACKAGING & IND. CONV.	180	19	4	45	111	2
TISSUE	2,759	263	475	104	650	1,267
TOTAL PAPERBOARD	**13,700**	1,616	1,403	9,554	903	224
KRAFT,BLEACHED & UNBL.	2,330	—	—	2,193	72	65
SEMICHEMICAL	1,945	—	—	1,851	94	—
RECYCLED CONTAINERBOARD	2,400	10	8	2,370	12	—
OTHER RECYCLED	7,025	1,606	1,396	3,139	725	159
CONSTRUCTION PAPER & BOARD	**952**	392	271	230	58	—

Data on waste paper are collected in an industrywide survey of paper and paperboard mills under the following definitions.
1989-Actual Consumption
1990-Best estimate based on year-to-date experience
1991-1993-Consumption at capacity levels of production

Thousands short tons

planned future consumption

END PRODUCTS	1990 Total	Mixed Papers	Newspapers	Corrugated	Pulp Substitutes	High Grade Deinking	1991 Total	Mixed Papers	Newspapers	Corrugated	Pulp Substitutes	High Grade Deinking
TOTAL ALL GRADES	**22,044**	2,583	4,096	10,731	2,709	1,925	**23,826**	2,723	4,457	11,593	2,950	2,103
TOTAL PAPER	**6,398**	507	2,299	212	1,693	1,687	**7,061**	572	2,544	231	1,853	1,862
NEWSPRINT	1,813	62	1,751	—	—	—	2,026	96	1,930	—	—	—
PRINTING & WRITING	1,393	30	13	65	943	341	1,519	32	13	68	1,031	375
PACKAGING & IND. CONV.	174	20	4	45	104	2	186	21	4	46	112	2
TISSUE	3,019	394	531	102	646	1,344	3,330	423	596	117	710	1,485
TOTAL PAPERBOARD	**14,641**	1,669	1,491	10,291	952	238	**15,693**	1,737	1,570	11,117	1,028	241
KRAFT,BLEACHED & UNBL.	2,681	—	—	2,534	69	78	3,084	—	—	2,895	111	78
SEMICHEMICAL	2,025	—	7	1,914	105	—	2,064	—	12	1,943	109	—
RECYCLED CONTAINERBOARD	2,642	28	41	2,560	12	—	3,014	48	62	2,890	14	—
OTHER RECYCLED	7,293	1,641	1,443	3,283	767	160	7,531	1,689	1,495	3,389	794	163
CONSTRUCTION PAPER & BOARD	**1,005**	407	307	228	63	—	**1,072**	413	344	245	69	—

END PRODUCTS	1992 Total	Mixed Papers	Newspapers	Corrugated	Pulp Substitutes	High Grade Deinking	1993 Total	Mixed Papers	Newspapers	Corrugated	Pulp Substitutes	High Grade Deinking
TOTAL ALL GRADES	**25,362**	2,875	4,994	12,151	3,077	2,264	**27,148**	3,007	5,353	13,298	3,177	2,313
TOTAL PAPER	**7,875**	657	3,019	238	1,947	2,013	**8,394**	741	3,304	242	2,053	2,054
NEWSPRINT	2,499	157	2,342	—	—	—	2,769	210	2,559	—	—	—
PRINTING & WRITING	1,644	38	41	71	1,072	422	1,739	49	86	71	1,100	434
PACKAGING & IND. CONV.	193	21	4	46	119	2	195	21	4	46	122	2
TISSUE	3,539	441	632	121	756	1,589	3,691	461	655	125	831	1,619
TOTAL PAPERBOARD	**16,371**	1,788	1,618	11,653	1,060	251	**17,628**	1,834	1,687	12,794	1,053	258
KRAFT,BLEACHED & UNBL.	3,329	—	—	3,136	111	83	3,560	—	—	3,397	76	87
SEMICHEMICAL	2,233	—	12	2,110	111	—	2,296	—	12	2,173	111	—
RECYCLED CONTAINERBOARD	3,088	54	68	2,953	14	—	3,861	59	77	3,711	15	—
OTHER RECYCLED	7,720	1,734	1,539	3,455	824	169	7,911	1,775	1,599	3,514	852	171
CONSTRUCTION PAPER & BOARD	**1,116**	430	356	259	70	—	**1,125**	432	361	261	71	—

Totals not adjusted for rounding differences.

Projects included in survey estimates

Expansion projects include new paper, paperboard, and wood pulp mills and new paper and paperboard machines in existing mills. These projects have been publicly announced by the managements of the companies concerned and are included in the capacity estimates reported in this survey. Survey estimates also include confirmed expansion projects that have not been publicly announced which, in keeping with the confidential nature of the survey, are not included in this listing.

Thousands short tons

Grades	Annual Capacity	Proposed Start-up	Company & Location
Newsprint	245†	1990	Alabama River Newsprint Company, Claiborne, AL
Newsprint	225†	1989	Newsprint South Inc., Grenada, MS
Newsprint	245	1991	North Pacific Paper Company, Longview, WA
Newsprint	195†	1989	Ponderay Newsprint Company, Usk, WA
Newsprint	230	1989	Southeast Paper Manufacturing Company, Dublin, GA
Coated Groundwood	220 net*	1989	Blandin Paper Company, Grand Rapids, MN
Coated Free Sheet	265	1990	Champion International Corporation, Quinnesec, MI
Coated Free Sheet	212	1991 1992	Consolidated Papers Inc, Wisconsin Rapids, WI
Coated Free Sheet	225	1990 1991	Scott Paper Company, Skowhegan, ME
Uncoated Free Sheet	300	1991	Boise Cascade Corporation, International Falls, MN
Uncoated Free Sheet	240	1993	Champion International Corporation, Courtland, AL
Uncoated Free Sheet	325	1991	Georgia Pacific Corporation, Ashdown, AR
Uncoated Free Sheet	240	1991	Union Camp Corporation, Eastover, SC
Uncoated Free Sheet	300†	1990	Willamette Industries Inc, Bennettsville, SC
Uncoated Free Sheet and Specialty Papers	30	1989	Kimberly-Clark Corporation, Whiting, WI
Tissue	80	1990	Chesapeake Corporation (Wisconsin Tissue Division), Menasha, WI
Tissue	n.a.	1989	Fort Howard Paper Company, Rincon, GA
Tissue	n.a.	1991	Fort Howard Paper Company, Rincon, GA
Tissue	65	1993	Fort Howard Paper Company, Green Bay, WI
Tissue	70	1989	FSC Paper Company, Alsip, IL
Tissue	68†	1990	Kimberly-Clark Corporation, Jenks, OK
Tissue	n.a.†	1990	Kimberly-Clark Corporation, Loudon, TN
Tissue	30	1992	Mosinee Paper Corporation, (Bay West Paper Division), Middletown, OH
Tissue	45 net*	1992	Potlatch Corporation, Lewiston, ID
Tissue	70	1993	Procter & Gamble Company, Oxnard, CA
Specialty Packaging Papers	59	1990 1991	Consolidated Papers Inc., Stevens Point, WI
Special Industrial Papers	n.a.	1989	Hollingsworth & Vose Company, Hawkinsville, GA
Unbleached Kraft Linerboard	350	1990	Gaylord Container Corporation, Bogalusa, LA
Unbleached Kraft Packaging Paper	100	1990	Longview Fibre Company, Longview, WA
Unbleached Kraft Paperboard	375	1990	Mead Corporation, Mahrt, AL
Unbleached Kraft Linerboard	235 net*	1991	Union Camp Corporation, Savannah, GA
Solid Bleached Paperboard	220††	1992	Westvaco Corporation, Covington, VA
Recycled Containerboard	350	1993	Daishowa America and Trans-Rim Enterprises, Ltd., Stockton, CA
Recycled Paperboard	60	1989	Newark Boxboard Company, Mobile, AL
Recycled Containerboard	210†	1993	Temple-Inland Inc., Maysville, KY
Recycled Paperboard	35	1990	U.S. Paper Mills Corporation, Menasha, WI
Bleached Sulfate Market Pulp	480	1991 1992	Alabama Pine Pulp Company, Claiborne, AL
Bleached Sulfate Market Pulp	260	1991	Stone Container Corporation, Port Wentworth, GA
Bleached Sulfate Market Pulp	400	1990	Weyerhaeuser Company, Columbus, MS
Bleached Sulfate Market Pulp	105	1991	Union Camp Corporation Eastover, SC

n.a. = not available **Will replace existing capacity* *†New Mill ††Eventual capacity 350*

•PRACTICAL MAXIMUM CAPACITY

Practical Maximum Capacity, as defined in this survey, is the tonnage of paper, paperboard or pulp of normal commercial quality that could be produced with full use of equipment and adequate supplies of raw materials and labor, and assuming full demand. No allowance is made for losses due to unscheduled shutdowns, strikes, temporary lack of power, etc., which cause decreases in actual production but not in productive capacity. Capacity of paper machines which produce more than one grade is apportioned in accordance with actual production patterns or plans for future operation.

Capacity is reported in short tons of net finished paper and paperboard and air-dry (10% moisture content) pulp. Shrinkage of bleached or semibleached pulp is taken into account.

Annual practical maximum capacity— includes changes in capacity only for the portion of the year in which they are actually effective.

Year-end practical maximum capacity— assumes that all changes in capacity are in effect from the first day of the year in which they occur.

NEW MACHINES AND NET IMPROVEMENTS: Capacity increases or decreases are shown in two main groups: New Machines and Net Improvements.

New Machines — are defined as machines purchased or to be purchased from equipment manufacturers. Consequently, capacity changes resulting from transfers of paper machines from one mill to another are shown under Net Improvements.

Net Improvements — are defined as net changes resulting from modernization of machines, dismantling old machines, shifts in grades, etc.

Capacity increases from new machines are shown under New Machines for the first two years of operation (including the year of installation). Any additional capacity realized in a third or subsequent year is shown under Net Improvements.

MARKET PULP CAPACITY: Market pulp in this survey is defined as wood pulp produced in the U.S. for sale to pulp consumers. It excludes pulp for use or consumption by a producing mill or for shipment by a producing mill to other mills within its supply region which it owns, controls or with which it is affiliated. Shipments to owned mills outside the U.S. are defined as market pulp.

•PAPER GRADES

NEWSPRINT: Paper used chiefly in the printing of newspapers, made largely from mechanical pulp and weighing not less than 28 pounds nor more than 35 pounds (24 x 36 - 500).

UNCOATED GROUNDWOOD: Uncoated papers containing more than 10% groundwood or other mechanical pulps in their furnish, excluding newsprint.

MACHINE AND OFF MACHINE COATED: Bleached papers with a coating weight of at least 2 pounds (25 x 38 - 500) on either side and at least 50% of the coating consisting of clay (Kaolin).

Coated Groundwood: Coated papers containing more than 10% mechanical pulp (mostly stone groundwood and/or refiner) in their furnish.

Coated Free Sheet: Coated papers containing 10% or less mechanical pulp (mostly stone groundwood and/or refiner in their furnish).

UNCOATED FREE SHEET: Bleached uncoated printing and writing papers containing not more than 10% groundwood or other mechanical pulps in their furnish; i.e., offset, tablet, envelope, business papers (bond, ledger, mimeo, duplicator) form bond, cover and text and related papers.

BLEACHED BRISTOLS: Includes tabulating index, tag and file folder, coated cover bristols, and uncoated bristols (index, printing, and postcard).

COTTON FIBER: Papers containing 25% or more in their furnish of cotton, cotton rags, cotton waste, linters, linter pulp, flax, or similar fibers.

THIN PAPERS: Includes carbonizing, condenser, cigarette, bible, and similar papers.

PACKAGING AND INDUSTRIAL CONVERTING: Wrapping paper, shipping sack, bag and sack other than shipping sack, and other converting papers -- 18 pounds and over.

Unbleached Kraft: Paper containing more than 80% unbleached sulfate wood pulp. Wrapping paper, shipping sack, grocers sack and other bag, and other converting papers -- 18 lbs. and over (24 x 36 - 500).

Bleached Packaging and Industrial Converting: Paper made for similar end uses as unbleached kraft, but made from bleached, and semibleached sulfate and unbleached sulfite pulps. Wrapping paper, shipping sack, grocers and other bag and sack, and other converting papers -- 18 lbs. and over (24 x 36 - 500).

Specialty Packaging: Paper and board of all weights and furnishes, usually used as protective packaging for food and other consumer products, such as bakery bags, fast food and frozen food wraps. Also includes glassine, greaseproof and vegetable parchment paper.

Special Industrial: Paper and board, of all weights, calipers and furnishes, designed for specialized end uses and manufactured to exact customer specifications; includes abrasive paper, electrical insulation, filter paper and similar grades. Does not include wet machine board.

TISSUE: Includes sanitary grades i.e., toilet, facial, napkin, toweling, sanitary napkin, wiper and special sanitary papers, and waxing, wrapping, wadding and miscellaneous grades.

• PAPERBOARD GRADES

UNBLEACHED KRAFT PAPERBOARD: Paperboard made from a furnish containing not less than 80% wood pulp produced by the kraft sulfate process.

Linerboard: Unbleached kraft paperboard manufactured for use as facing material when combining paperboard for conversion into corrugated or solid fiber boxes. Includes solid unbleached kraft linerboard, both Fourdrinier and Cylinder, mottled white linerboard and clay coated unbleached kraft linerboard.

Folding: Paperboard manufactured, such as clay coated unbleached kraft and bleached lined unbleached kraft backed, for conversion into folding cartons and beverage carriers.

Other: All unbleached kraft paperboard whose end use is not otherwise classified, such as board for a filler for solid fiber board to be fabricated into a shipping container, tube, can, drum, file folder, tag, automotive panel, etc.

SOLID BLEACHED PACKAGING PAPERBOARD: Paperboard made for use in packaging from a furnish containing not less than 80% virgin bleached wood pulp. Bleached bristols not manufactured for packaging are included in the proper bleached bristol classification under papers.

Linerboard: Solid bleached paperboard, either Fourdrinier or Cylinder, manufactured for use as facing material when combining paperboard for conversion into corrugated or solid fiber boxes.

Folding: Solid bleached paperboard for conversion into folding cartons, such as folding cartons for ice cream, butter, oleomargarine, frozen foods, bakery products, cosmetics, drugs, etc.

Milk Carton and Food Service: Solid bleached paperboard for conversion into milk carton, heavyweight cup, and round nested food container, plate, dish and tray, and for packaging for moist, liquid and oily foods.

Other: Solid bleached paperboard for conversion into packaging of blister pack, tubes and other products not classified above and for industrial products not classified under bleached bristols.

SEMICHEMICAL PAPERBOARD: Paperboard made from a furnish containing not less than 75% virgin wood pulp, the predominant portion of which is produced by a semichemical process.

RECYCLED PAPERBOARD: Paperboard manufactured from a combination of recycled fibers from various grades of paper stock with the predominant portion of its furnish being recycled fibers, sometimes including a very minor portion of virgin fibers.

Linerboard: Recycled paperboard produced from a furnish containing less than 80% virgin kraft wood pulp and used as facing material when combining paperboard for conversion into corrugated or solid fiber boxes.

Corrugating Medium: Recycled paperboard produced from a furnish containing less than 75% virgin wood pulp and used as the fluting material when combining paperboard for conversion into corrugated boxes.

Container Chip and Filler Board: Recycled paperboard manufactured as a filler for solid fiber board for conversion into solid fiber boxes and other container chipboard (all chipboard under 26 pounds per 1000 sq. ft. manufactured for use as facing corrugated, solid fiber and single faced products which are used for interior packaging, e.g., pads, partitions, dividers, layers and cushioning).

Folding: Recycled paperboard manufactured with bending quality for conversion into folding cartons (including unlined chipboard, kraft lined, white lined and clay coated).

Set-up: Recycled paperboard manufactured with non-bending specifications for conversion into rigid or set-up boxes (including plain chipboard, newslined, white vat lined).

Gypsum Wallboard Facing: Recycled paperboard manufactured for use as liner or facing on gypsum board and plasterboard (includes white, cream, gray, blue and all colors).

Other: Recycled paperboard with the same characteristics as paperboard for bending packaging or non-bending packaging but not for non-packaging uses; plus recycled paperboard for end uses not otherwise classified, such as tag, file folder, tube, can, drum, match stem, tablet backs, toys, etc.

•CONSTRUCTION PAPER & BOARD

CONSTRUCTION PAPER: Sheathing paper, felts (roofing felts, floor covering, automotive felts, deadening, industrial, pipe covering, refrigerator), asbestos paper and asbestos filler paper, flexible wood fiber insulation.

WET MACHINE BOARD: Binders board, shoe board (e.g., counter board, heel board, innersole, etc.) automotive board, chair seat backing, coaster board, luggage, mill board, panel board, table top board, etc.

INSULATING BOARD: A fibrous-felted homogenous panel made by interfelting of the fibers (e.g., interior building board, wallboard, sound deadening board, acoustical tile, exterior sheathing board, roof insulation board, trailer board, etc.).

•WOOD PULP

DISSOLVING & SPECIAL ALPHA: Highly refined bleached white sulfite or sulfate pulp with a high content of alpha (pure cellulose) fiber.

SULFITE PAPER GRADES: Paper grade pulps produced by the sulfite process. Bleached pulp must achieve a G.E. Brightness of more than 75.

SULFATE PAPER GRADES: Paper grade pulps produced by the sulfate or soda process. Bleached pulp must achieve a G.E. Brightness of more than 75. Semibleached pulp must achieve a G.E. Brightness of not less than 45 or more than 75.

SEMICHEMICAL: High yield pulps produced with the use of some chemical agent such as neutral sulfite (N.S.S.C.), alkaline cook, chemipulp (defibrated pulp put through reaction chambers), chemimechanical pulp with a yield usually above 60%.

MECHANICAL: Fine textured, usually bright pulps, used in paper and paperboard manufacture and produced by mechanical rather than chemical processes.

Stone Groundwood: Pulp produced by grinding wood logs or bolts (usually 4 ft. in length) into relatively short fibers.

Refiner: Pulp produced by subjecting wood chips and/or residues to atmospheric or open discharge refining.

Thermomechanical: A high-yield pulp produced by a thermomechanical process in which wood particles are softened by preheating under pressure prior to a pressurized primary refining stage. Usually replaces or reduces the chemical pulp component in newsprint or groundwood papers.

•WOOD PULP FOR CONSTRUCTION PAPER & BOARD

Coarse, often brown, pulps used in the manufacture of insulating board and construction paper. Also includes similar pulps if used in the manufacture of wet machine board. Excludes pulp for hard pressed board.

Stone Groundwood and Refiner: Pulps produced by the stone groundwood or refiner processes but used in the manufacture of construction paper and board.

Defibrated/Exploded: Pulps produced by subjecting wood chips to preheating and pressurized refining. Similar to the thermomechanical process except that operating variables produce an economical, coarse brown pulp suitable only for construction paper and board.

Screening: Rejects and off-quality screenings from all grades of wood pulp except dissolving.

•FIBERS

Roundwood: Comprises roundwood bolts and logs (4 feet or longer, including tree lengths) brought to the pulpmill for chipping, or chips made from primary roundwood bolts and logs at a chipmill, remote from the pulpmill.

Forest Residues: All logging residues such as portions of bolts or logs less than the minimum diameter specified by the consuming mill and poles, saplings, slash, limbs, twigs, or portions of bolts or logs not regarded as merchantable in normal pulpwood or sawlog operations. May also include merchantable portions of trees that will not be used for higher value products. Chips made from forest residues.

Manufacturing Residues: All mill residues, such as slabs, edgings, trimmings, cores, planer shavings, sawdust or other wood residues of a wood manufacturing process and chips made from these residues.

Other Fibers: Cotton linters, cotton linter pulp, textile mill waste and cuttings, rags, waste rope and cordage, bagasse, flax, straw, jute, esparto, kenaf and all other vegetable fibers used in paper and paperboard manufacture.

•WASTE PAPER

Definitions are abstracted from the Institute of Scrap Recycling Industries (ISRI) Scrap Specifications Circular 1988. The 49 grades and 51 specialty grades in this circular have been condensed into the five groupings listed below.

Mixed Papers: Mixed papers, super mixed papers, boxboard cuttings, mill wrappers, specialty grades and all other grades not elsewhere specified. ISRI grades 1-5 and 18-22S, and 24S-51S.

Newspapers: Old newspapers, special news (including deink quality) over-issue news, white blank news, groundwood computer printout, publication blanks, mixed groundwood and flyleaf shavings, coated groundwood sections. ISRI grades 6-9, 22-27, 44 and 28S.

Corrugated: Old containers both corrugated and solid fiber, container plant cuttings, kraft paper and bags. ISRI grades 10-21.

Pulp Substitutes and High Grade Deinking: Includes ledger, tabulating cards, bleached sulfate shavings (unless used as a news substitute). Envelope and bleached sulfite and sulfate cuttings, coated book stock and computer printout. Print free grades are reported as Pulp Substitutes and printed grades, if deinked, are reported as High Grade Deinking. ISRI grades 28-43, 45-49.